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Curve of Spee—Mandibular Movements and Articulator Design—*Needles*

Art in Dentistry—*Stevenson*

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Preservation of Dental Literature in Libraries—*Weinberger*

EDITORIALS

Accomplishments of the Cleveland Meeting

Relief for Russian Dentists

What I Saw in Russia and Plans for Relief

The Japanese Catastrophe

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Florestan Aguilar

Madrid, Spain

THE JOURNAL
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Original Communications

First: DID THE DENTISTS OF FIFTY YEARS AGO POSSESS GREATER OR LESS SKILL THAN THE AVERAGE DENTIST OF TODAY?

Second: HAVE THE DENTAL SCHOOLS OF AMERICA ADOPTED THE BEST CURRICULA POSSIBLE FOR THE MAKING OF DENTISTS?

By EDWIN T. DARBY, D.D.S., M.D., LL.D., Philadelphia, Pennsylvania

(Read before the Illinois State Dental Society, Decatur, Illinois, May 8-10, 1923)

MANY of you may wonder why I have chosen the subject which has just been announced by your president. One reason is to confirm or refute the oft-repeated assertion that the dental schools are not turning out as good practical dentists as constituted the profession forty, fifty or sixty years ago.

You will, I am sure pardon a personal allusion because it may be an assurance that I am familiar with some of the conditions which existed in the profession at the time of my entrance upon the practice of dentistry.

Sixty years ago, on the first day of April last, at the age of seventeen, I put out a sign bearing my name, and began the practice of dentistry. Fifty-seven years of that time I was a teacher in a dental college, first as demonstrator of operative dentistry, and forty-three years as professor of operative dentistry. At the time I entered practice there was but one state in the Union which had a law regulating the practice of dentistry. Anyone with much or little knowledge could engage in practice. As there were but three dental colleges in America and their combined attendance was less than the registration in one of the smaller colleges today, it would seem that the great majority of those entering upon the prac-

tice of dentistry were either self-educated, or instructed by a preceptor, instead of a dental faculty. Few dentists sixty years ago had dental diplomas. Some had the medical degree which they had earned by attendance upon lectures, others had honorary degrees in both medicine and dentistry which had been conferred because of distinguished merit. In forming a just estimate of the character of material of which the dental profession consisted sixty years ago one must take into consideration the advantages (or lack of advantages) in an educational way fitting the candidate for the special calling of dentistry. The fact that he was a graduate of medicine, unaided by special technical training, did not fit him for the practice of dentistry any better than a theological training would fit him for the practice of law. Some of the poorest dentists I ever helped to make, were men who had tried medicine and having made a failure in that calling, selected dentistry as promising better results. The men whose names are historic and were in practice when I began, were practically self-educated. Most of them had spent a year or more in a preceptor's office and laboratory which was considered sufficient qualification for practice. There were many things these men did not know—things that today we esteem as absolutely essential to the intelligent practice of dentistry. His knowledge of anatomy was meager and confined largely to the head and face. Of minute anatomy and histology he knew nothing. Of physiology he knew but little, likewise of pathology, materia medica and therapeutics. There were but few—perhaps a half dozen—drugs that he made use of in his practice. Creosote, oil of cloves, arsenic for devitalizing pulps, camphor, iodin and morphin were almost his whole materia medica. Carbolic acid was not used in America until 1862 when a Philadelphia druggist imported it.

I remember with horror the perfect recklessness and abandon with which I administered chloroform and ether to all who asked for an anesthetic, and this, too, with my patient in a sitting posture, and I as ignorant of its physiological action as a child of ten. Surely a special providence must have been watching over the dentists of that day or many more deaths would have been recorded.

The dentist of that day had never heard the word bacteria, nor did he hear it until 1874. The word bacteriology did not appear as a dictionary word until 1884 when it was first seen in the Oxford dictionary.

He had never heard the names of Koch or Pasteur or Lister. Of the microscope he had no intimate knowledge. His nomenclature was bad. He called the pulp of the tooth the nerve. An alveolar abscess or granuloma was an ulcerated tooth. If it had a sinus with a papilla on the gum it was a "gum-boil." His knowledge of the treatment of the pulp was extremely limited. He had no instruments for pulp-canal work unless he made them himself. There was not to be found a single set of pulp-canal instruments in any dental supply house in America until after 1863. He rarely attempted saving posterior teeth if the pulp was exposed because he had no instruments with which to treat and fill them. Sometimes he barbed watch-makers' broaches and extirpated the pulps and did the best he could with the instruments at his disposal to fill the canals with gold or tin foil. He spoke of cohesive gold as *adhesive* or "sticky" gold. His choice of filling materials was limited to gold foil, tin foil, amalgam (which he often made in his laboratory) and Hill's stopping. He had no oxychloride of zinc, none of the zinc phosphates, none of the silicate cements. His crown work was confined to the single-rooted teeth. Nearly all were inserted on hickory wood dowels. Human teeth were often used because they were more life-

like in appearance. But there were enough things that the dentist of sixty years ago did know to make him an acceptable and satisfactory dentist for that day. What he lacked in scientific knowledge he made up for in technical skill. If he had been fortunate enough to have had a good preceptor, and had spent one or more years as an apprentice, he was able to fashion, point, and temper his own instruments, to alloy his gold, roll it into plate, swage it between dies, rim, back and solder fourteen teeth to a gold plate, with a mouth blowpipe and an alcohol lamp. He could manipulate non-cohesive foil with a skill and dexterity that not one man in a hundred can match today. Many of their fillings are to be seen today, after fifty or sixty years of service. The graveyards of America are filled with such fillings. It is a pleasure—sometimes a mournful pleasure, to recall the names and faces of the men who were at the height of their professional glory when I entered the profession. Many were men of robust character, and charming personality. Some were men of great dignity and stateliness of bearing. Some were God-fearing men who preached the gospel on Sunday with the same fervor that they packed non-cohesive foil into teeth on Monday. Whether they saved as many souls as they did teeth has not been told.

Some were artists, others poets of no mean ability. Some were high-livers and hard drinkers but they possessed so many charming qualities that an appreciative clientele overlooked their shortcomings and loved them just the same. Distance often lends enchantment to the view, and the tendency is to exalt and magnify the things of our youth, but as I recall the men who constituted the dental profession of my youth those of that day would not suffer by comparison with the members of the profession of this day.

It is true that those men would not size up to our present standard of scientific attainments. We must remember that the sum total of human knowledge has increased enormously during all the years that have passed. Few of those men could pass the examinations of a State Board today, and most of them would fall down if subjected to the ordeal of a faculty examination in any of our dental colleges. The skill of those men was a technical skill which years of experience and a special fitness for a peculiar calling had developed. It was not the skill which scientific study and research would have given them, because they were almost wholly lacking in that.

And now we come to the second query, which was announced as the subject of this paper: "Have the dental schools of America adopted the best curricula possible for the making of practical dentists?"

Let it be understood at the outset that I disclaim any intention of captious criticism of the dental schools of this or other countries. Having spent the greater part of my life as a teacher, it would be ignoble and ungenerous to condemn, or speak disparagingly of the curriculum which the various schools have adopted, because I know from experience that more conscientious thought has never been given to any system of education than the faculties of dental schools have devoted to the training of young men for the practice of dentistry.

When the Baltimore College of Dental Surgery came into being in 1839 its founders believed that the curriculum should embrace some of the subjects taught in the medical schools of that day. Hence they added to the so-called dental subjects anatomy and physiology and a year or two later the chairs of microscopical and comparative anatomy and chemistry. For many years the course in Medicine and in Dentistry consisted of two years of four months each. One can readily imagine how illy pre-

pared for the practice of medicine a candidate for graduation would be after eight months' attendance upon didactic lectures, with no laboratory or clinical advantages, no bedside instruction, no hospital experience, no State Board examination, but turned loose upon a confiding public, a menace to the community in which he settled. Mention is made of the above facts that it may be realized what an enlarged curriculum now obtains—so large indeed that from five to eight years of nine months each is demanded before the candidate is eligible for graduation and even then he is only partially instructed and inadequately fitted to practice more than a single branch of the healing art.

To meet the demands of the public and the demands of the professions of medicine and dentistry, year after year has been added to the course until now with an enlarged curriculum it is almost impossible to fit the average candidate to practice more than a single specialty of either medicine or dentistry.

The demand for a preliminary education before entrance upon either medicine or dentistry is appropriate and just. But there is one serious barrier which still remains, namely, to determine whether the would-be dental candidate is fitted to enter upon the study of dentistry. I am tempted to quote at some length from a paper which E. C. Kirk read some years ago at an annual banquet of the Eighth District Dental Society of the State of New York. He says: "The value of a stringent examination, preliminary to the technical dental educational curriculum, cannot be questioned: but the nature of such preliminary examination as to scope and details, is one which requires the most careful consideration. It may be regarded as still unproven that a degree in arts and letters, or its equivalent culture, is prerequisite to the making of a successful practitioner of dentistry. In a broad sense, such previous culture is beneficial and highly desirable in a dental practitioner, just as it is in a lawyer, a clergyman or any other man. A stringent enforcement of such a standard with respect to the preliminary culture for dentists would unquestionably tend to the production of a professional body of cultured dental practitioners; that such general culture would *per se* be evidence of their superiority as dentists may be strongly doubted. The function of a preliminary examination is to determine the fitness of a candidate to pursue the curriculum that leads up to the calling that is to be his lifework."

Dentistry requires something more for its successful practice than general and technical knowledge, it demands in the majority of its procedures the highest development of technical skill. A man may be a brilliant genius intellectually and a flat failure as a dentist. He may be a walking encyclopedia of knowledge without the ability to successfully fill or treat a diseased tooth. It is a happy combination of these elements of technical knowledge and manipulative skill in the individual which places him in the front rank of superior dentists. Therefore, if a preliminary examination is to have any value in testing the fitness of a candidate to enter upon the dental curriculum, it must satisfactorily determine whether he is possessed of those qualities, natural or acquired, which make him capable of further acquiring that high degree of manipulative skill which it is a function of the dental curriculum to impart. Such a knowledge of the fitness of a candidate, there is good reason for believing, can be better acquired by a preliminary examination modeled upon the final examination of our highest grade manual training schools, which require, beside history, languages, mathematics and English, a good working knowledge of the physical sciences, drawing, etc., a practical demonstration of the manual dexterity of the student which tests his knowledge of

tools, their manipulation and uses, coupled with a degree of familiarity with the physical properties of the materials upon which the tools are employed, and a practical knowledge of the constructive uses to which these same materials are put. It is along this line that the technical part of the dental curriculum is being developed and there is every reason why the same idea should to a degree be included in the examination which serves as the entrance to that curriculum, "the preliminary examination therefore being selective in quality and directed toward the discovery of the natural qualifications of the candidate and his fitness for entrance upon the study of dentistry, not whether he is fit to study law, medicine or theology, which could be as readily deduced from a preliminary examination in arts or letters exclusively." It is twenty years since Dr. Kirk suggested the manual training school as a proper place from which to select candidates for the study of dentistry. Many changes have been made in the curricula of our schools since then, but (so far as I am aware) no method has been devised for testing a candidate's fitness for the profession of dentistry. Every day, and commonplace as is this matter of choice, and important as it should be considered in all its aspects, it nevertheless appears from the most casual observation that young men are constantly mistaking their calling and laboring on year after year with no prospect of future success.

There is no more pitiable object than the young man who is attempting to make a success of a thing for which he has no adaptation or fondness.

A dentist once said to me "I have retired after thirty years of practice, and am glad to be out of dentistry. I never wanted to be a dentist. My predilection was for law, and for that I am sure I was fitted, but my parents urged me to study and practice dentistry because they had a friend who had made a great success as one. My social position attracted to me a large and desirable clientele and so far as outward appearance goes I have been a success, but I have hated it from the first."

It seems unfortunate that the candidate for a dental degree must go into his second year before he knows whether he has technical qualifications. His High School training, his year in the department of Arts and Science cannot fail to have been of great value to him. It has given him a broader outlook upon life and made him a better qualified candidate for the dental department. The question of great importance at this period of his life is, has he selected the right profession or calling in life? But you tell me that is a matter which will adjust itself—that the unfit will fall by the wayside and not complete their college course, or having entered upon practice, will learn by sad experience that they have mistaken their calling, and seek for other fields of endeavor more congenial. It is not alone in the dental profession that such misfits are to be found. The other professions abound in instances of a similar nature. The percentages of young men who enter professions and later abandon them for other callings is lamentably great.

The proclivities of men are not always glaringly manifest in youth. It often happens that men of mediocre attainments become celebrated because they have a special fitness, which circumstances bring to the front, and they outrank their fellow men because nature has made manifest one talent which towers above all others. Such were some of the great dentists of former times.

Three years have been added to the dental course within the past forty years.

Formerly a college course began on the first day of November and ended on the first day of March. A candidate who had been five years in practice was eligible for graduation upon attendance of one college year. The medical

schools demanded but little if any more. As fast as medicine advanced the dental schools added to their requirements. Especially was this true of such schools as were affiliated with universities. Be it said to the credit of the dental faculties, they were as eager to keep pace with the sister profession as circumstances would warrant. But it would seem that a lengthened course and an enlarged curriculum has acted as a detriment to the general public in that it has prevented many young men from entering the dental profession. The cost of a dental education has increased so enormously during the past few years that many are debarred because they cannot meet that cost. It must be remembered that most young men entering a profession are poor, their parents are also poor. From $5000 to $7000 are required for a five year course in dentistry. How is the poor young man to meet that sum?

It is estimated that there are in this country about 49,000 dentists to meet the needs of 107,000,000 people. The average dentist in full practice, working 300 days per year can care for not more than 300 or 400 people. If these figures are approximately correct there are 2300 persons per dentist who receive no attention beyond the extraction of teeth. It is no better in Great Britain and Allied countries. In Great Britain there are but 5000 registered or licensed dentists, and 12,000 unqualified (unlicensed) to care for the teeth of 40,000,000 people.

The late war has brought to our attention the appalling condition of the teeth of men demanded for military service. In France alone 250,000 able bodied men were rejected because of defective, or a deficiency of teeth. At a time when they were so badly needed in the army a large proportion of those rejected men were supplied with artificial substitutes through the instrumentality of Dr. Georges Villain of Paris after which they were admitted to the ranks to do service for their country. A similar service was rendered the fighting men of this country by the 10,000 American dentists who enlisted in their country's service. Even then the number was inadequate.

But what, you ask, is to be the remedy? How are these millions of people who receive no dental service to be cared for? The dental hygienist is doing much to enlighten the people. He, or she, is the voice of one crying in the wilderness, but their mission is to prepare the way for the practical dentist. At the present time scientific dentistry is a luxury and so regarded by the masses, and it is becoming more of a luxury each year because of the conditions which have made scientific dentistry. Its cost is beyond eighty per cent of the people. As a result an appalling number go without dental service.

My answer is specialization, for the reason that the total bulk of dental knowledge is more than can be absorbed by a single mind.

Second. That the increase of dental knowledge cannot be compassed by lengthening the curriculum indefinitely, hence a stop must come somewhere.

Third. That with the increase of dental knowledge there has occurred a demand for public dental service that has increased in inverse ratio to the supply of dentists.

Fourth. That the dental hygienist is only a partial answer to this public demand for dental service, good as far as it goes, but still inadequate for the public need.

Fifth. That the only practical way to make more dentists is to simplify the dental curriculum by dividing it into two categories, one of which shall be to make practical dentists soundly trained and educated to a point where they will be safe to entrust with the care of the teeth of the public, these to be marked with a licentiate degree equivalent to bachelor grade; and the other group after

sufficient additional training to be graduated as of master grade, in accordance with the plan in vogue in Great Britain, with respect to the medical qualification.

The simplification of the curriculum should be accomplished on qualitative rather than on quantitative lines, e. g., the course for the Bachelor (licentiate) qualification should teach the meanings and purpose of the x-ray as a means of diagnosis. It need not contain a course in radiography and should not contain a discussion of the physics of radiant energy. It should teach, and teach strongly, x-ray interpretation. So also with microbiology. The licentiate should know the meanings of various infections and be able to correctly interpret a bacteriological report from the clinical laboratory, but it is a waste of his time and of no practical use to him to know the biochemistry of bacterial action in detail, or the reactions of all the pathogenic bacteria to stains and culture media, and so on throughout the whole scientific side of the curriculum.

These more elaborate scientific aspects of the curriculum should be embodied in the major course leading to the master degree, a degree that will be sought by those in training for specialism, research work and teaching positions. We need many more well trained practical dentists to meet the demand of public dental service and we can get men, a sufficiency of them, if we reduce our educational system to a simplified basis, sacrificing nothing of the useful, but eliminating much of the theoretical and ultra-scientific from the course leading to the licentiate.

In conclusion, I am strongly of the opinion that the dental schools should so modify their curricula that a greater number of young men will be induced to enter the profession of dentistry. The tendency of specialization in our profession is fast becoming apparent, as it has long since been in medicine. Already we have oral surgery, prosthodontia, exodontia, orthodontia, periodontia, radiodontia, pontiodontia, removable bridgework, and in each of these specialties there is abundance of material to keep their followers engaged. To master all of these is beyond the ability of the average man. Dr. Eliot of Harvard, said years ago. "The science of medicine has become so great and complicated that it would require twenty years of a man's life to master the whole subject." The same is in a measure true of dentistry. All that we can hope to do is to teach the student the essential principles of the scientific branches so that he can intelligently apply them to his practical work.

In the teaching of scientific subjects the application of *principles* to practice are often overlooked, and the mind of the student is crammed with disconnected data, often at the expense of his practical work. Say what we will, we cannot ignore the mechanical side of a dentist's work. Most of a dentist's life is spent in performing mechanical acts. The man who is deficient in technical skill is not, and cannot be, a successful dentist. It was that quality that made the skillful dentist of former years, and it is that quality, plus an adequate scientific knowledge which will make the good dentists of the future. But, you ask: "After all these years of earnest endeavor to formulate a curriculum co-equal with that of the medical schools, would you abridge or curtail it and make the road into the profession an easy one?" I am on record as having said: "that the ideal education for the dentist would be four years in the department of Arts and Science, with the degree of Bachelor of Arts, then four years in the medical school with the degree of Doctor of Medicine, and finally from two to three years in the dental school for technical training and the degree of Doctor of Dental Surgery," but to accomplish all this would require from ten to eleven years, with an expenditure of as many

thousand dollars, which is beyond the reach of most of those who would choose dentistry as a profession. This broad culture has been tried by some, but most of those who have gone as far as the completion of their medical course, have recognized the larger field of medicine and have turned their attention from dentistry to the practice of some one of the specialties of that profession. Many things that are desirable are not expedient. In view of the fact that the peoples of all civilized countries are suffering for dental service, it behooves us to devise some means of meeting that ever present and growing need.

Discussion

M. L. Hanaford, Illinois: I confess to almost wishing that I might suggest a slight change in the first part of the title of this paper, so that it would read: "Did we dentists of fifty years ago possess greater or less skill," etc., for I am certainly proud to be numbered among those who began the study of dentistry at that early date and know personally many of the giants of those years.

In 1870 I entered the office of a practitioner of dentistry as a student. At the end of four years I had taken a course of four months in a dental college, which together with good office instruction, both in laboratory and operating room, gave me a fair working knowledge of dental subjects as conceived in that day. However, because I lacked one year of the requisite five, I could not come up for graduation.

Dr. Darby spoke of the expense of a dental education as at present required, but I want to tell you that in those earlier days with much shorter courses of instruction the financial problem was often no small one. I remember I was allowed to give my note for my tuition, and my father had to sell a government bond to provide ready money for railroad fare and living expenses. My roommate was the afterwards distinguished dental teacher Professor Clark L. Goddard, of San Francisco, and more than once did I advance from my own small allowance funds to pay his weekly board bill.

College instruction was indeed meager, but no apology need be made for the quality of it—Harrison, Allen, McQuillen, Stellwagen, Howells, Smith, Garrettson, Flagg, to mention only a few. Then there were wonderful operative clinics by truly great men, Marshall H. Webb, Louis Jack and others of like caliber. Students were taught to manipulate gold foil as a sine qua non and wonderful operations were shown as models.

I remember seeing Marshall H. Webb restore with gold condensed by the electromagnetic mallet the major part of the crown of a molar tooth, which restoration was retained by three converging screws set in the dentin. A waste of time and strength, according to present day ideas, but granting the expediency of such an operation, I doubt the ability of any living man to accomplish it. Attention and training have been diverted into other directions.

It goes without saying, that ideals change with the broadening of human knowledge and it would be easy to mention things that are done now every day as a matter of routine, not even dreamed of fifty years ago. It is only a question of requirement and direction of effort that makes the seeming difference.

And so also the dentist of fifty years ago knew nothing of the wonderful and beautiful prosthetic restorations or the magnificent productions in porcelain that are now absorbing our attention, but he was no less accomplished in his own, possibly smaller, field of endeavor.

I have always believed religiously in the system of office pupilage as a means of teaching a student the rudiments of dentistry and accomplishing what Dr. Darby insists is necessary at the outset of his career, namely, the "sizing up" of a young man's ability and fitness for continuing his studies in the dental school. I believe the instruction and advice of a good conscientious dentist would go far toward keeping out of the profession much poor material, and at the same time would prevent an enormous waste of time and money, to say nothing of disappointed ambition in the cases of a great number of young men. The weeding out and pruning should be done before the dental school takes the student. He should know what dentistry is as no green boy can know; he should know good dentistry from bad dentistry; he should and could very easily know something of the use of tools and the working properties of steel and other metals, and above all, he should know how to study and have gotten the habit.

It is evident that so tremendous a burden would be taken off the teachers, because the student would have a fair idea of his job, would know what he was there for, and could be reasonably sure that a good dentist was going to satisfy his ambition to be a useful citizen of the world.

I believe the suggestions of Dr. Darby coming as the mature thoughts of a teacher of many years' experience should receive careful attention; that the practical or manipulative side of dentistry should be paramount in the preparation of a student for his lifework, taking care, however, that first a broad foundation shall be laid in the necessary sciences.

To this end I do not think a further lengthening of courses of instruction is at present justifiable, but rather a judicious choice of subjects, and a more intensive training in things required day by day in the operating room.

C. N. Johnson, Chicago, Illinois: Dr. Darby has said in his treatment of this subject that some of the most discouraging students he has been called upon to teach were those who had studied medicine and had made a failure of it and had then taken up dentistry. I think that has been the experience of very many of the dental teachers of this country. It would seem as if that should not be true. It would seem as if the study of medicine was the best possible foundation for making the best kind of a dentist. I do not know why it is that practically up to this time it has not worked out in that way.

Dr. Darby has referred to the days of the past when we had less experience than we have today in such things as the administration of drugs, and particularly in the administration of anesthetics. I want to confess with some shame, that in the early days I administered chloroform with the utmost ignorance of what I was doing, and yet I never had an accident. Whether the people in those days had tougher constitutions than they have now I do not know. I shiver yet when I think of the things I did with chloroform, and I apologize to every individual to whom I administered it.

Dr. Darby referred to another thing that appealed to me very forcibly, and that was the type of men who stood out as the leaders of the profession in those days. Dr. Darby might have given you a list of men who came under his personal acquaintance, many of the highest type of professional men, men of the highest cultural attainments. He showed me a list he had made out of the men whom he had known in the early days, and you would not blush for your profession if you read that list and if you knew those men as Dr. Darby knew them. I knew some of them myself, and these men carried with them a cultural atmosphere that would grace any profession, medical, legal or clerical. You need not blush for the antecedents of your profession. Read the history of dentistry; read the history of these men. We do not frequently enough go back into the history of our profession. If we did, we would have more respect for it than we do now.

Another thing Dr. Darby hinted at, and that I have heard spoken of many times, is the claim that we should be able to tell in the first year or two of a student's life whether he was going to make a good dentist or not. I used to think that myself, that it was possible to size a student up and form a very definite opinion as to whether he would succeed in dentistry after he had been in the institution a year or so; but I am not so sure of that now. My judgment has been proven wrong so many times that I have a great deal of reservation in the matter. I have seen some of the most unpromising material start in college, the most discouraging students to deal with, students who seemed almost hopeless and yet with some quality which made them plod on and on, while their progress was slow and discouraging, they eventually turned out to be very creditable practitioners. We have many instances of that kind. The student I am most afraid of is the bright chap who comes to us with plenty of money furnished by his parents, money that he did not earn himself, without any responsibility in the case. The man who makes a splendid race to begin with, who seems to master his studies easily, with no obstacles, is the one I am afraid of. Some of the greatest men we have in the profession today were called blockheads when they began the study of dentistry. There is one quality I would demand of any student more than any other, namely, the disposition to plod and keep everlastingly at it. It so happens that it requires, as Dr. Darby intimated, probably a wider range of ability to be a successful dental practitioner than to practice almost any other profession. As is frequently said, he must be an artist, a physician, a mechanic. He must be all those things. But there is hardly any quality demanded of a successful practitioner of dentistry that may not be cultivated by application by the average individual. There is very little in the way of genius, as we understand genius, that is demanded of a student, provided he has the qualities that I have mentioned in the way of perseverance.

The reference Dr. Darby made to the possible advantage of a double standard of practitioner of dentistry has set me thinking very seriously. I am not able to see it exactly in the light that he sees it. I cannot bring myself yet to the point where I want to

acknowledge a double standard for the practice of dentistry in this country. I base my opinion largely upon the experience of some of the older countries. I want to invite your attention for a moment to the experience some of those countries have had. There has practically been a double standard as he said in England, the registered and the unregistered men, and that plan has been in operation there for many years. There has been practically a double standard in Germany which has been in operation for very many years. I do not like to make a comparison of the status of a profession in one country and in another country. But I will ask you to look and see if dentistry has advanced or served the people in those countries better than we have served the people of America with a single standard. I believe it will be acknowledged that we give better service to the rank and file of the people than they get in other countries. I want to feel that way, and I want to see that always exist.

Dr. Darby has mentioned the fact that the people of this country are not being adequately served, and some solution of that problem must come. I believe it must come largely through the intimation that was made by Dr. Black when he was talking on something allied to this subject. I believe the solution of the proper care of the people's teeth in this country will come by going farther back into the situation and by organizing and carrying out a campaign of prevention of dental disease rather than trying to cure dental disease. And I am very proud of the fact that the attention of the profession of medicine and of dentistry is more and more being directed to the problem of prevention. It is not such a serious problem as we have been led to believe. It is a problem that has been worked out, as Dr. Black said, in Bridgeport, Connecticut, as one concrete example, in a way that offers the greatest encouragement to the dental profession. I want to direct your attention to this one feature of our work. I believe that in that movement lies the greatest advancement of the future, and when we go back far enough, when we begin an adequate campaign for the prevention of dental disease, and combine as a profession to influence the intelligence of the people whom we serve, I believe that the advance is going to be very rapid. I believe that the coming generations of the American people are going to progressively exhibit a very much better condition of their teeth, a very much healthier condition of the mouth as the result of this movement.

I want to pay my tribute of respect to the men who have been pioneers in this propaganda for the prevention of dental disease. If we follow in their footsteps, we must go at it in the right way, and the right way is to so instruct the people that they will do the work. It resolves itself down to the matter of education. I welcome every means of educating the people of this country as to the significance and necessity of the care of the teeth of the children. We will not reach the goal in a few years. There will be many, many cases where the teeth will be neglected, and you and I will be called upon to do much reparative work, and in this connection I want to say that it is our bounden duty to do that reparative work in the best possible manner and with the utmost conscience. After we have done that, and in connection with doing it, we must devote the best energies of our lives to the education of the people and bring them to realize the fact that the prevention of these diseases is more important to their children than to try to effect a cure.

I want to say one word, in connection with the matter of dental education or the influence upon the student to which Dr. Darby has referred. I make the statement here and now that what I conceive to be one of the most important functions of dental teachers is not instructing students in the technic of our profession. We must teach them technic of course, and we owe it to them to give them the best technical procedures we know anything about. But the greatest good done to a student in a dental college is not technical training so much as it is the professional spirit he imbibes from his teachers; and he gets that professional spirit not alone by word of mouth and cultural instruction, but more by the example set by the teacher in his everyday intercourse with him. You may preach to a student till doom's day, but you will make little impression on him for good unless he sees in your daily life the thing worth emulating.

Frederick B. Moorehead, Chicago, Illinois: There is no reasonable basis of comparison between yesterday and today. The men of yesterday cannot be lined up as against the men of today. One cannot test the knowledge of the men of yesterday as over against the knowledge of the men of today. If one could subtract the sum of knowledge acquired in the passing of the years one might possibly reasonably compare the past with the future. Comparisons of this sort, therefore, are naturally more or less odious. I think it is perfectly safe, however, to state that the man of yesterday had a finer professional spirit than the man of today and the reason is not difficult to find.

Dentistry today is more of a business than it was yesterday. Yesterday dentistry was more of a profession than it is today. And, in this particular, dentistry is merely taking upon itself the nature and spirit of the times. The world is over-commercialized. Every nation is running riot in commercialism. We have lost our perspective and our appreciation of the finer things—the first things of life. In all this maelstrom the dentist is caught up with others and apparently is unable to extricate himself. So long, therefore, as the commercial grip is on the dentist is not likely to acquire a finer type of professional spirit. Speaking parenthetically for the moment, the commercialism of the world will some day break down and when it does it will be the biggest breakdown the world has ever known.

In the beginning the so-called learned professions, first theology, and then law, and later medicine, were clearly distinctive in their reactions. They were more or less set apart from the commercial world and were characterized by a fundamental idealism which embraced both scholarship and ethics. It is well to keep these facts in mind in making a comparison between the present and the past.

The dental curriculum is in itself of considerable interest and one must always keep in mind the antecedents of dental education before one can discuss intelligently dental education of today. For some unknown reason medicine failed to include the mouth in the early development of the medical school and this fact alone accounts for the development of the dental school, a matter much to be regretted. It would seem that dentistry had its origin in the failure of the school of medicine. Perhaps some day we shall reorient the whole subject of medicine and properly include, in some sort of reasonable program, the preparation for general and special lines of practice. In the lengthening of the course of instruction in dentistry an effort has been made to add what is known as medical material, largely in answer to the challenge that the dentist is not a medical man and that dentistry itself is largely an occupation rather than a profession. Unfortunately the mere addition of medical subjects has not been fortunate or happy or even useful. A cross-section of the present day curriculum of dentistry reveals a most interesting condition. On the one hand we have a large body of medical sciences; on the other hand a large body of technical processes, and the one does not in any sense complement the other. The sciences are not vitalized in the clinical teaching largely because the traditions of dentistry do not emphasize health as paramount. Furthermore the dental student is caught up in the general emphasis of values and is concerned chiefly with technical dentistry; the teacher of clinical dentistry is either uninterested in the fundamental sciences or is unable to vitalize them in his teaching, largely because he has no training in the fundamental sciences. When the medical student comes in contact with clinical medicine at once his knowledge of the fundamental sciences is called into play. The dental student, on the other hand, when he arrives at a point where clinical dentistry forms a part of the curriculum at once departs from the fundamental sciences and naturally forgets them. Curiously enough it is largely impossible to make a physician and a dentist out of the same individual. Men are divided largely into two groups—the abstract and the concrete. The one works largely with his brain and the other with his hands. This classification is strikingly apparent among undergraduate students, the one making high grades in theory and unsuccessful in the technical laboratory; the other successful as a technician but slow in acquiring theory.

Another subject in Dr. Darby's paper that has been discussed for several years deals with the argument that more dentists are needed. I am sorry to take specific issue with him on this point. We do not need more dentists half so much as we need more qualified dentists. The addition of numbers will never solve the problem but the addition of quality will. Training more physicians to treat typhoid fever, more physicians to treat yellow fever, more physicians to treat smallpox, or training more physicians to treat diphtheria would be uneconomic and indeed unscientific. The problem of yellow fever, of typhoid fever, of smallpox, of diphtheria was solved by the application of science and not the multiplication of doctors. Dentistry will never solve its own problem and will never acquit itself at the bar of society until it learns the nature and cause of dental caries. The breakdown of Dr. Darby's argument in his plea for more dentists is found in the fact that he is arguing for repair instead of prevention. Perhaps we shall never be able to adequately repair the teeth of all people so long as dental caries remains a mystery. It would seem wiser to emphasize the prevention of dentistry rather than terminal treatment. I am not for a moment ignoring the responsibility of service nor am I forgetting the serious and tragic fact that the majority of teeth that are removed because of infec-

tion are teeth that have been dentistried. Perhaps in this light the argument for more dentists condemns itself.

In speaking a further word about prevention I want to state in all seriousness and with all conviction possible that a well trained dental hygienist will probably accomplish more in the prevention of dental caries than the dentist who concerns himself very largely with inlays, crowns, and bridges. We can see much good in the operations of the conscientious woman who has been well trained for this particular function. After giving this question of dental hygiene very careful thought I have come to believe that it offers a large measure of solution of the present problems of dentistry. It sounds almost like heresy to place the value of the dental hygienist on a par with the dental practitioner but after all it must be remembered that one will deal almost entirely with prevention and the other with repair. And along with this problem of hygiene and the training of the hygienist there will come a better and finer appreciation of the child and his needs. We are now beginning to study the mouth of the child in relation to the whole child, remembering that the interdependencies bind all of the parts into a composite whole. The hygienist of the future will naturally be more or less of an expert in the knowledge of foods, of sanitation, hygiene, etc.; she will know something about the home life and will advise with the mother on matters pertaining to the mouth and the prevention of caries.

Let me finally emphasize the fact that the problem of this hour is the development of a bigger body of scientific knowledge, a knowledge that will lead to the recognition of the nature of caries and the prevention of the end-results of caries.

William H. G. Logan, Chicago, Illinois: The first question Dr. Darby presented was: "were the dentists of sixty years ago equal to the average practitioner of today?" We can only judge from history, and we believe the dental practitioner of sixty years ago was a better technician in gold foil and in the production of gold dentures; but is there not a reason for this skill? Today I believe that we graduate better gold foil workers from our colleges than we did twenty-five or forty years ago. And it is also equally true that the senior student in college puts in more gold foil fillings than he ever does in a single year thereafter, which means that the technic necessary to insert gold foil does not have an opportunity to be developed by the practitioner of dentistry today to the point that it was necessary twenty-five and fifty years ago. The gold inlay is largely accountable for this change.

The second question under consideration was: Can we by examination determine which individual will be a successful practitioner of dentistry? I think not. In some of our universities during the last few years examinations have been held to determine, if possible, which ones probably would be found fit for higher education, and in some of the universities by the tests taken it was determined that only 20 to 30 per cent were suited for higher education. Surely more than such a percentage would be benefitted by the added years beyond the high school education. I believe you cannot settle the question which man will be found to be the best senior at the end of the freshman year, let alone determine before he enters school whether he will be a successful practitioner of dentistry or not.

The third problem stressed was: Shall we try to create two types of dentists? First, the practical dentist: second, the medically trained dentist. I think there should be only one type of dentist to start with. If he wishes to specialize after graduation that is a different problem. But in the problem of dental education, not the post-graduate, but the undergraduate problem of dental education should be for one purpose and one purpose only, namely, to create a good general practitioner of dentistry in all that the breadth of the term implies. It is not to my mind wise to try to create the kind of practitioner of dentistry that will really open one side of his office to partially trained women, and on the other side to a technician. Do not misunderstand me. I am in favor of the dental hygienist but I am opposed to the dental technician who is being educated all over this country in dental schools if that dental technician is to be given a diploma indicating that he is a professionally skilled man.

In England, as was reported by Dr. Darby, there are only four or five thousand graduate practitioners of dentistry. But there are a number of thousands of licensed practitioners practicing dentistry who have never been in a dental school. Please get that point. It will bother you five years from now. Up and down this country they are going to educate the dental technician, and they have already in a given state licensed him with a degree—prosthetic dentist, P.D., and the case is now in the courts. So I say to you, one of the greatest problems immediately ahead is to keep dentistry for dentists, or you will

have the problem that medicine has to contend with, the chiropractor, the osteopath, and many other types of practitioners interfering with the care of the health of the people. It will come unless we step in and hold for dentistry the things for which she is trained.

Let us in our dental schools require sufficient preliminary training, which will surely be a year of college, and so required by the Dental Education Council of America of all first class A schools beginning in the year 1926, with a year of college and four years of dental education in its entirety under the control of the dental faculty. I believe we can produce men that can master all of the general problems of dentistry, and therein I slightly differ with Dr. Darby. I know, and you know, that you may go into the offices of men who are caring for every phase of dentistry and doing it well. That is not a compelling condition with those of us who practice in a large city like Chicago for there we have specialists available. The real function of a dental school should be to teach students some of the practical essentials of dentistry the day they enter school, teach them technical dentistry, and the sciences which should be carried through the entire four year course. And as Dr. Moorehead very properly said, there has not been in dental education in the past a connecting up of the sciences with the purely practical problems of dentistry. How is it going to be overcome? There will be within a year or two in all of the dental schools of America the diagnostic clinic. At the end of his sophomore year the student will be required to study two months in the summer vacation period to ascertain the connection of the science laboratory with the patients who present themselves in the infirmary or the clinic. He will be taught to connect the sciences with the patient before he will be allowed to perform a dental operation. In that way we will connect the two. Your science teachers will cease to teach eight months in the year, but continue for ten months, and there will be a requirement of ten months and not eight during the junior and senior years, two months of which will be annually devoted to the instruction in clinical and laboratory diagnosis. The only way we can teach him is to make that a requirement of the dental schools. The foregoing is a necessity, as I see it, to overcome the greatest weakness now found among dental practitioners. I believe you will agree with me when I say that if you tell the average dentist a crown is needed, a plate is needed, a root-canal should be filled, or a tooth removed, he can do it rather well; but because he has not been trained in the connection between science and practice he does not always know which to apply.

In conclusion, we have sufficient time in the four-year course to create good dentists, but we will improve the quality by carrying them through the diagnostic clinic, for they will then return to you not only better than the men of fifty years ago, but many times more efficient than the students we are graduating today.

The question of dental education is going to be brought to the masses of the profession and you will help solve it. But I believe, among other things, that a college year will be demanded and four years of dentistry will be all that is needed. I feel that dentistry should not further intermingle with medicine. I believe that dental students should not be taught with medical students, but should always be kept apart from the day they enter the dental school. A high regard and love for their profession should be instilled into their minds and hearts, and any medical or science teachers that do not sincerely respect and properly evaluate dentistry should not be allowed to teach dental students because it will reduce their respect for a splendid profession, that of the general practitioner of dentistry.

H. W. McMillan, Roseville, Illinois: I believe that the general practice of dentistry is a good foundation, which should be laid before one attempts to follow any of its branches as a specialty. In my little town of Roseville, I have had to become an orthodontist, an exodontist, a prosthodontist, a radiodontist, and a periodontist.

It was my privilege to hear Edward Ochsner, of Chicago, lecture in Monmouth last year, in which he gave the opinion that in the medical profession, there has been too much of a tendency, in recent years, to graduate specialists direct from the schools: that there were better medical men sent out between 1890 and 1910 as general practitioners, with broad foundations, than there are today with its tendency to narrow specialization; and that nine-tenths of the needed medical and surgical attention can be given by the general practitioners.

It seems to me, that, as dentists we should be more thorough students of diet. One important point not sufficiently stressed, is that of tubercular milk. Several counties in Northern Illinois have more than 15 per cent of the dairy cattle tubercular, said to have been shipped in from Wisconsin on account of a

more stringent law. Bovine tuberculosis is very virulent and communicable to children especially who drink the tubercular milk. Through our Legislative Committee, we should ask for the enactment of a law on this subject, as good as they have in Wisconsin.

Principally, I wish to bring to you the message that Dr. Ochsner brought to us in Monmouth, namely: the idea of the importance of a general, broad knowledge for the medical men, which, I believe should apply to the dental men also.

Louis Ottofy, Chicago: As someone has said, the profession is commercialized. This commercial, or rather economic phase of dental education of the future has to be considered from another standpoint. It came up forcibly in the Philippines when I was assigned to organize the dental school in the University of the Philippines. I insisted that the students receive a proper preliminary education, which was not then standardized in the Islands. I proposed that the requirement to enter the dental school should be the degree of Bachelor of Arts, and that this should be followed by a four years' course in dentistry. I lost out in regard to the Bachelor's degree, but after considerable difficulty succeeded in securing the four years' course in dentistry. The objection to the long preliminary course proposed, followed by the long dental course, led to the consideration of the economic side of the subject. The matter was thoroughly discussed, and it was brought out that a man's period of education must bear a relative proportion to the period of his productivity. In other words, you may not take a man and educate him up to the age of thirty, and then leave him perhaps only twenty years of real, active usefulness. With the Filipinos that counted a great deal. You do not find many men of advancing age in a well-preserved condition. In the Philippines, and other tropical countries, the active life of men is shorter than in the temperate zones; there are very few, indeed, who are in active practice for forty or fifty years. After the age of forty a man's usefulness diminishes, and at fifty it is vastly reduced.

Now then, when we consider that a man must have eight years of primary education, four years of high school, four years of college, four years in a dental school and a few years of experience to develop his efficiency, he is nearly thirty years of age. That leaves for him from ten to twenty years of efficient usefulness in practice. Economically considered, or as a good business proposition, it is too high an investment of time and money, to be compensated for by the brief period of intensive, useful productivity as a practitioner.

The idea was brought out by Dr. Darby of the need of a double standard of education in dentistry. I do not look upon this exactly in that sense, but rather as a coming need of reducing the period of the time in education to the requirements of the specialist. It is not at all unlikely that if we insist on requirements beyond the actual need to produce good dentists or specialists in dentistry, the people, who eventually must pay for the extra time and money expense involved, may dictate to the profession through its legislative bodies, the length and extent of the courses and the degrees to be conferred upon dentists as well as upon dental specialists, such as hygienists, mechanical dentists, orthodontists, etc.; in fact, in a measure this is already the case in a number of states so far as dental hygienists are concerned.

Edmund Noyes, Chicago, Illinois: The increased appreciation in comparatively recent years of the close relation of mouth diseases to diseases elsewhere has made it absolutely indispensable that there should be a greater co-operation between the dental and the medical professions. The only way in which this can possibly be accomplished is in the education of dentists reasonably well in the fundamental sciences of medicine, and I do not see how we can shorten the dental course wisely or develop two sorts of dentists. It is true, that there are not dentists enough to do the dental work that is demanded of us, but the remedy should not be sought in a lowering of educational standards.

It seems to me, the increase of efficiency in the dental profession, aside from the encouragement we can give young men to enter in greater numbers, the full course of training in dentistry, must come by increasing the number of people we can serve. First, by the training and service of dental hygienists who will do a very great and very important work in public institutions and public schools, who will also be valuable assistants in private offices.

The question is continually advanced that these people are likely to practice dentistry. The same thing was contended by the physicians before the institution of the trained nurse, and you know the usefulness of trained nurses today with respect to the medical profession, and the complaint that trained nurses practice medicine is very seldom heard and is of very little consequence. It will not

be any more important in the case of the dental nurse.

I like that term better than hygienist. The dental nurse will do some work which would otherwise occupy the time of the dentist. She will do a more important work in the care of children to such an extent that the work which those children will require to have done will be greatly diminished, and so the dental practitioner can serve a larger population. The other means for increasing the efficiency of the profession is careful and proper training of the dental laboratory man. A training which makes him competent to do the mechanical operations that can be done outside of the mouth, and that is where the line should be drawn. None of these men should be allowed to approach a patient to do anything in that patient's mouth; that should be reserved for the practitioner with a dental degree. On these two lines I believe the efficient service of the dental profession can be greatly and safely increased.

Dr. Darby (Closing): I do not think I have been clearly understood. I had to make a plea for the 80 per cent of the people of this country, and a larger percentage of those of Great Britain and in other parts of the world, who are suffering for want of dental service. I was thinking mainly of the people who do not get dental service when I spoke upon that phase of the subject. It seems to me a shame—a burning shame,—that millions of people in this and other countries should go without dental service except the extraction of teeth, or perhaps the extraction of many teeth. There is one part of Great Britain in which there are 162,000 people with only one licensed dentist. There are parts of our own country where thousands of people dwell, that have no dentists at all. There are many people in France that hardly know the name of dentist. There are people in Germany, Austria and Russia who are suffering continuously from toothache. Those of you who have visited the parks of London or Paris or Berlin or Vienna and have sat down on the benches for rest or sunshine, have seen within a half hour a number of people whose swollen and bandaged faces told the story of abscess or dental pain in some form—going this way and that moaning with pain. You may go through any of our large cities, New York, Chicago, Boston, Philadelphia or any of the cities of Europe, and in the stillness of night after the hum of industry, the merry shout of childhood, and the wild cry of revelry has ceased, (especially is this true in the streets where the poor dwell), you will hear the moaning of some child who is suffering from pulpitis or alveolar abscess, and this because its parents are too ignorant or too poor to provide the services of a dentist. This is not an overdrawn picture, there are thousands of children suffering now because of ignorance and the cost of dental service. It is for these I am pleading.

I think Dr. Moorehead is just a little Utopian when he suggests that the time may come when caries of the teeth will be prevented by serum, the same as typhoid fever, hookworm, smallpox and other diseases that the Rockefeller Foundation (God bless them) are combating. In the meantime, while we are waiting for that glad day, when science is going to prevent dental caries, we must bear in mind that there is the ever-present need of dental service for the masses. I would not do anything to make dentists less competent, I would do nothing to make them less scientific, but I would do something if I could for the whole world, that there might be less dental suffering.

PRACTICAL USES OF THE CURVE OF SPEE

By J. W. NEEDLES, A.M., M.D., D.D.S., Pueblo, Colorado

(Read before the American Dental Association, Los Angeles, California, July 17-21, 1922)

THE slogan of this meeting has been announced as "Dentistry Can Add Ten Years to Life." If there is any truth at all in the theory of focal infection this is certainly the truth. I can well remember extracting a number of snags for a patient who was mentally and physically in such condition that he did not have the slightest interest in what was going on about him, and we all felt that he could not live more than a few weeks. I did not see this patient again for two months at which time he had so far recovered that he had the freedom of the hospital grounds and I did not even recognize him as the same man. Afterward I constructed dentures for him which he exhibited at a clinic. It has been fully demonstrated that the extraction of diseased teeth with the making of efficient dentures has brought comfort and increased life to many patients.

The two essentials of efficient dentures are good impressions and good articulation. In studying articulation we can learn much from the movements of the mandible, and the form and arrangement of the teeth in fine natural dentures. If we examine the lateral projection of an ideal natural denture we will find that if "a curved line be drawn touching the summit of the buccal cusps of the teeth from canine to third molar, it will more or less accurately correspond to the arc of a circle with its convexity downward. The upper lingual cusps will be found to occupy a similar line." "This is frequently spoken of as the compensating curve of the molars and bicuspids and also as the Curve of Spee" (Fig. 1). In an ideal case if this curve is continued backward it will pass through the articular surface of the Glenoid Cavity. "We find then that the general line of the teeth is that of the arc of a circle. That portion of the fossa over which the condyles glide is also an arc which is either concentric or identical." This is the description of ideal conditions as found in the American Textbook of Prosthetic Dentistry. George S. Monson has also added the idea that in ideal cases all of the cusps of the upper teeth and the articular surfaces of the fossae lie upon the surface of a sphere whose radius is approximately four inches, and that the long axes of the teeth radiate from the center of the sphere (Figs. 2 and 3).

Experience shows that these conditions are nearly realized in many natural dentures and we may consider it as an ideal toward which nature tends. But in practice we find many cases which are far from ideal and which deviate in a marked degree from these conditions. If we hope to give satisfactory denture service we cannot construct our plates upon ideal lines but we must make them conform to the idiosyncrasies of the patient. In order to do this we must know what the deviations are and use a technic which records these peculiarities and

an articulator which can be adjusted to the individual needs.

If we take a pair of bite plates and build upon them bite rims, the occlusal surfaces of which conform to the surface of a four-inch sphere, in place of the usual bite rims, we find that these bite plates have several interesting and valuable qualities. We can learn from these a great deal concerning mandibular movements and the properties of the curve of Spee (Fig. 4).

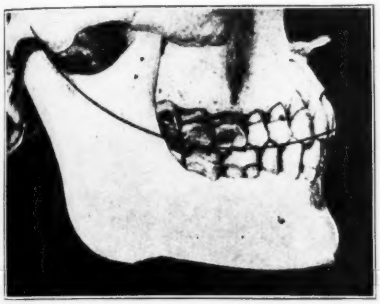

Fig. 1.—Curve of Spee.

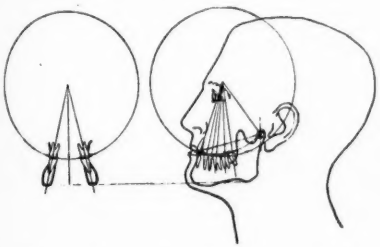

Fig. 2.—From George S. Monson (drawing of head).

In the first place such bite plates when placed in a patient's mouth will frequently allow the patient to move the mandible to every possible occlusal position and still maintain a balanced contact (in every portion of the rims). In other words, in executing all of the lateral and protrusive movements the mandible has been moving over the surface of a sphere. During these movements there has been no element of opening or closing of the mandible. The movement has been entirely confined to a sliding of the articular cartilage upon the articular eminence. We may then consider this as one of the two elementary movements of the mandible. The other movement is the opening closing movement and takes place about an axis through the head of the condyles. Every masticatory movement can be analyzed into these two elementary movements or components.

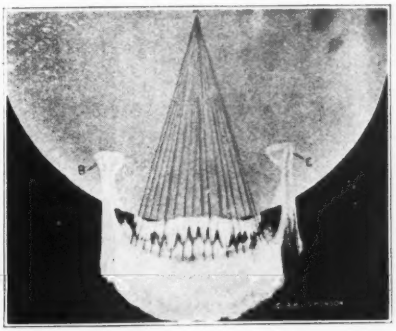

Fig. 3.—From George S. Monson (mandible and sphere).

Fig. 4.—Spherical bite rims.

The description so far has been of what may be considered ideal conditions. This requires that the condyle paths on the two sides be symmetrical; it also requires the condyle paths to lie upon the

surface of a sphere passing through the cusps of the teeth or upon one concentric with it. The condyle path may be considered a tangent to the Curve of Spee or to a circle concentric with it (Figs. 5 and 6). These conditions however do not exist in many cases. If the condyle slope is not the same on the two sides the radii of the sphere would have to be of different lengths on the two sides. If the condyle slope is steeper than that of the tangent the protrusive movement will result in a separation of the base plates at the heel (Fig. 7). This condition may be avoided by making the occlusal rims of a smaller radius thus deepening the Curve of Spee. This will result in making the condyle path tangent to a circle which is concentric with this new curve. We have thus restored the conditions for continuous contact of the rims. In the second case if the condyle path has a lesser slope than the tangent to the Curve of Spee, protrusion will result in an interference at the heel which will necessitate an opening of the jaws

Fig. 5.—From Prosthetic Dentistry showing condyle path.

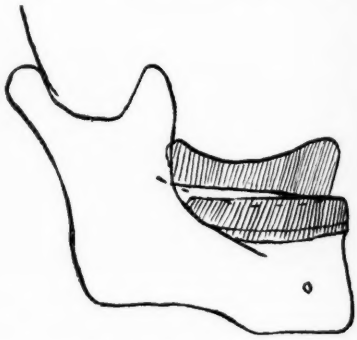

Fig. 7.—Flat bite rims.

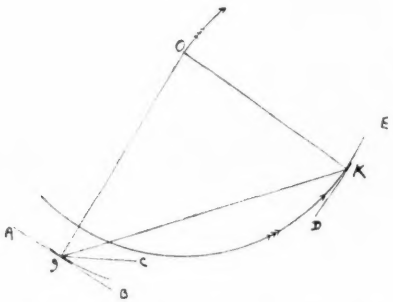

Fig. 6.—Drawing to show relation of condyle and incisal paths to center of sphere.

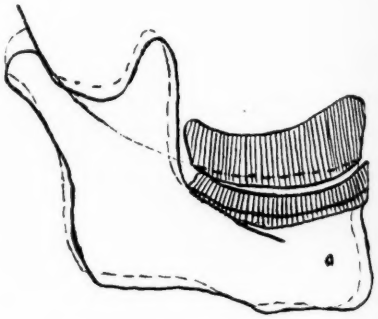

Fig. 8.—Too curved bite rims.

resulting in a separation of the anterior region while the posterior remains in contact (Figs. 8 and 9). In this case continuous contact is restored by flattening the Curve of Spee.

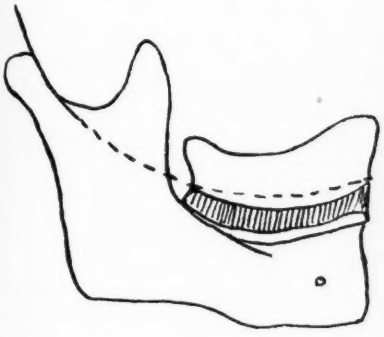

Fig. 9.—Centers of normal and too steep curves.

The relation of the condyle path to the Curve of Spee has a very important bearing upon mandibular movements. If the Curve of Spee as represented in the base

Fig. 10.—Radiograph of central and protrusive positions superimposed by double exposure.

plates is in harmony with the condyle path the mandible may be moved to any occlusal position without changing its distance from the maxilla. The movement is then confined entirely to the joint between the fibrocartilage and the articular eminence. There is no movement between the condyle and the fibrocartilage (Fig. 9). In separating the

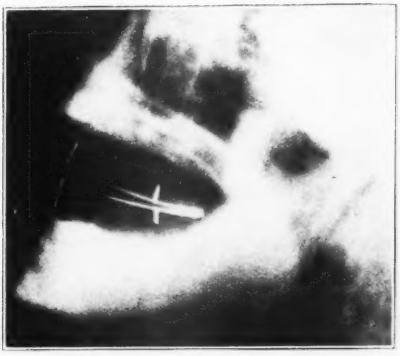

Fig. 11.—Radiograph of central and open positions of mandible, superimposed by double exposure.

mandible from the maxilla if the movement is only of a slight amount it may be considered to be a rotation upon an axis through the head of the condyles.

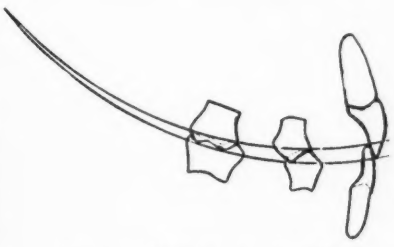

Fig. 12.—Drawing by Bonwill.

This movement will take place between the condyle and the fibrocartilage, and results in opening a crescentic space between the bite rims (Fig. 10). Bonwill also illustrated these same facts as shown in the illustration (Fig. 11). Here the opening movement is shown by the separation between the two arcs, the pro-

trusive movement is represented by a sliding of the mandibular arc in contact with the maxillary arc without any separation. The simultaneous execution of the movements results in the incisal movement. In fact every mandibular movement is composed of these two elementary movements combined in varying proportions and with variations in the direction of the sliding movement.

In studying tooth form it is apparent that the height of cusp represents opening movement while the horizontal dimension represents protrusive or lateral movement. The steepness of a cusp determines the ratio between opening and

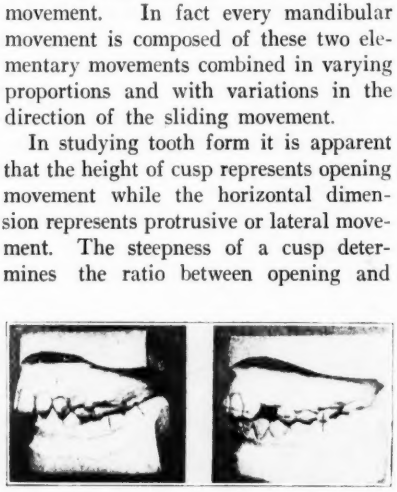

Fig. 13.—Casts of malocclusion and corrected case showing change in the Curve of Spee.

lateral or protrusive motion which is necessary for accurate articulation. The cusp height increases from back to front as shown by the separation between the two arcs, while the width of cusp remains constant, because all of the teeth are at about the same distance from the axis of protrusive and lateral motion. This requires the cusps of the anterior teeth to be sharper than those farther back. In order to have a perfectly balanced articulation it is necessary that the overbite of the anteriors and the height of the cusp of the posteriors shall be in strict proportion to the separation of the two arcs. If, however, we wish to have a greater overbite of the anteriors than the cusp height of the posteriors will allow, it can be accomplished by arranging the teeth to a steeper Curve of Spee. It was shown in the illustration of the bite rim with a steeper curve than that required by the condyle path that in protrusion there was a separation at the anterior portion of the bite rims (Fig. 8). This accounts for the additional overbite of the anteriors obtained by setting the teeth to a steeper Curve of Spee. This condition is frequently seen in those natural dentures with an excessive overbite. They are the retrusive cases and the Curve of Spee is always exaggerated (Fig. 13). If these cases have a balanced occlusion in the incisal position it is due to a flat condyle path. The correction of these cases requires the teeth to be arranged to the surface of a larger sphere thus flattening the Curve of Spee. Whenever we wish a more nearly end-to-end occlusion the curve of the teeth must be flattened. This corresponds to the bite rim which is too flat for the condyle path (Fig. 7). These bite rims separate at the heel when in incisal position. Here it is necessary for the cusps of the molars to be more nearly equal in height to those of the bicuspids and to the overbite of the anteriors. The protruded cases of natural teeth with end-to-end occlusion illustrate this condition. In correction of this class of cases the Curve of Spee is increased thus arranging the teeth upon the service of a smaller sphere. Flattening the Curve of Spee can be accomplished by elongating the teeth in the middle of the arc of the mandible while those at the ends of the arc of the maxilla are elongated. This results in opening the bite and diminishing the overbite of the anteriors. Increasing the Curve of Spee can be accomplished by elongating the maxillary teeth in the middle of the arc and those of the mandible at the ends of the arc. These changes require only elongation of teeth which is materially easier to do than is depression. We may conclude from this analysis that the Curve of Spee is a true compensating curve

which has been developed in harmony with the overbite of the teeth and the slope of the condyle path. Both of these factors are instrumental in developing the type of curve in any case. It is therefore illogical to take this curve and assume that the axis of protrusive and lateral motion passes through its center in all cases, for this disregards entirely the influence of the overbite. Those retrusive cases with a long overbite and an accentuated Curve of Spee are the very ones which require the flattest condyle path. It is not possible for such a path to be tangent to a circle concentric with the Curve of Spee.

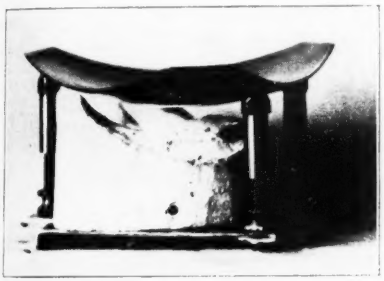

Fig. 14.—Spherical plate for forming spherical bite rims.

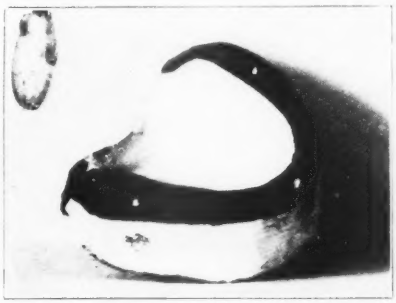

Fig. 15.—Pins in upper bite rim for use in taking tracing of mandibular movements.

The study of occlusion and articulation is of as great importance to the orthodontist and the periodontist in the detection of malocclusion and its resultant traumatism as it is to the prosthodontist, and in this study it is indispensable to obtain accurate models and bites and to mount them in their normal relations upon an articulator capable of reproducing the individual movements of the patient. These are the same requirements as the prosthetist's and necessitate a similar technic.

The spherical bite rims above described afford a very convenient and accurate method of taking the bite and recording mandibular movements. In this procedure base plates with modeling compound bite rims are prepared. By means of a spherical plate the sector of a four-inch sphere, the occlusal surface of either the upper or lower bite rim is molded to a spherical form at the position with respect to the jaw model which the occlusal "plane" is desired to have (Fig. 13). By trial in the patient's mouth it is determined if the position and direction of this surface is as desired. Any errors as to the placing of this surface are corrected at this time. The rim is then chilled and the occlusal surface lubricated with vaseline. The opposing bite rim is softened by heating and the bite taken in the usual manner, thus producing the opposing spherical surface upon it. Both base plates are then chilled and any overhanging edges trimmed away leaving only the opposing spherical surface. The periphery is also trimmed to the contours which the finished dentures are to have. If these bite plates are placed in the patient's mouth it will be observed that the mandible may be moved to every occlusal position and produce little if any separation at any part of the bite rims. The next step is to imbed three pieces of wire in the rim of the upper base plate. Heat one end of the wire and force it into

the modeling compound in the incisal region and pack the soft compound firmly about the base of the wire. In a similar manner place a wire on each side at about the position of the distal side of the first molar (Fig. 15). The wires are then cut off about one and one-half millimeters above the surface of the bite rim. The incisal wire should strike the lower bite rim near the anterior border when the plates are in central occlusion. The molar wires should strike slightly outside of the middle of the lower bite rim. These positions are necessary that the tracings to be taken will not run off the edge of the lower bite rim. Each of

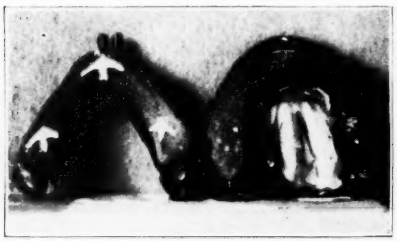

Fig. 16.—Tracings on base rim.

these wires thus prepared will act as a stylus to trace the paths of the respective points upon the surface of the lower plate. Dust the inside of the bite plates with powdered gum tragacanth to help keep them firmly seated on the ridges. Place them in the patient's mouth with instructions to close until one or more of the pins come into light contact with the lower bite rim. Have the patient move the mandible forward and back in the median line maintaining a light pressure on the bite rims. Soon the pins will come into equal bearing and each will cut a record of its path in the lower bite rim. This will be the path of straight protrusion. Before these paths become cut too deep have the patient retrude the mandible to its fullest extent and slide to one side and back again maintaining slight contact of the pins. Repeat this movement a few times and

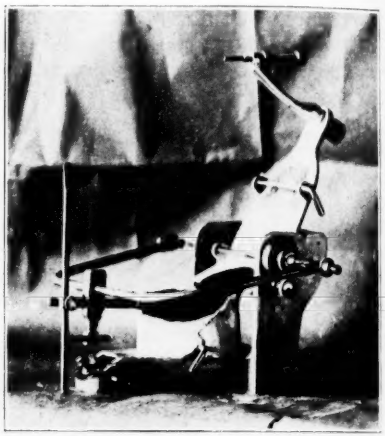

Fig. 17.—Mounting lower cast by means of face bow.

then do the same on the opposite side. By continuing these three movements in rotation the three paths are deepened

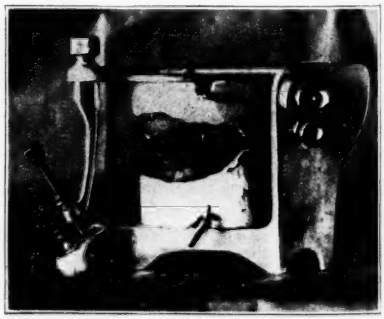

Fig. 18.—Upper model mounted by means of tracings on bite rim.

evenly until they are cut to the full depth of the respective pins. By this procedure we have maintained a balanced

three-point contact and each point has recorded its path for protrusion and for working bite for each side. If any separation has taken place between the bite rims at any point during these movements this fact has been recorded by a shallower tracing at that point. The form of the tracings (Fig. 16) will be found the same as Gysi's three-point tracing as illustrated in his article. In addition the depth of the tracings give a record of the vertical relations. When the three pins are in the anterior angles of their respective tracings, the bite plates are accurately held in central occlusion without the need of guide lines.

To adjust a case properly on the articulator it is first necessary to mount the lower cast by means of the face bow (Fig. 17). After waxing the base plates to the models they are then placed in central occlusal relation by the aid of the tracings on the lower bite rim and waxed in this position. The upper model is then attached to the upper bow of the articulator with plaster (Fig. 18). If the work has been carefully done, the correct central occlusion has been established since we have a definite record of all the mandibular movements and the central occlusion is at the apex of the tracings. If the articulator is one having the necessary adjustments for the reproduction of the individual mandibular movements of the patient all the data necessary for this adjustment is recorded in the tracings on the lower bite rim (Fig. 16). To make these adjustments remove the wax holding the base plates together and loosen the condyle path and incisal path adjustments and raise the incisal pin clear of the inclined surface which imparts the opening movements to the articulator. The upper model may now be moved so as to allow the pins of the upper base plate to come into their respective positions at the outer ends of one of the lateral paths. The condyle path on the moving side must be adjusted at the right angle to allow all of the pins to come into firm contact in the depth of the tracing. The condyle guiding mechanism is now locked in this position. Adjust the rotation point of the Gysi Adaptable or the incisal guide plate of my articulator to produce the indicated incisal path (Fig. 19.) The corresponding adjustment is

Fig. 19.—Adjustment of incisal path guide.

made on any other articulator. In the same way the adjustments are made for the opposite side. They should then be verified by sliding the bite plates from central position to each of the lateral positions and to incisal position and making certain that each of the pins follows its respective path and remains in contact with the depth of the tracing. As these movements do not contain any element of opening or closing movement the incisal guide pin must be raised clear of the inclined plane which imparts the opening movement. Since the opening movement is independent of the lateral or protrusive movement we may adjust

the articulator to produce any degree of opening and closing movement which we desire. This means that any patient can use any depth of cusp or any overbite which we decide is appropriate. The case is now mounted in its correct anatomical relations and the articulator adjusted to produce the movements natural to that patient.

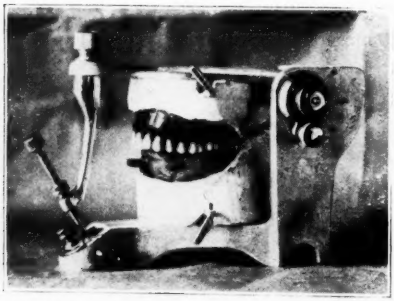

Fig. 20.—Upper teeth set up to lower bite rim.

In setting up the dentures prepare new base plates for both upper and lower models saving both bite plates for future reference. Having prepared the upper base plate replace the original bite plate on the lower model and beginning at the median line set the upper teeth to the contour of the lower bite rim giving the anteriors the overbite and overjet desired. The bicuspids and molars are set with all cusps in contact with the surface of the lower bite rim (Fig. 20). This will give the proper Curve of Spee and the proper inclination toward the median line for an average case. The lowers are then set in occlusion with the uppers. If the case is an average one it will be found to have an almost perfect balanced occlusion. If there are any errors they may be readily corrected by changing the inclinations of the teeth slightly. If a deep overbite is desired the teeth should be set to a steeper Curve of Spee. For

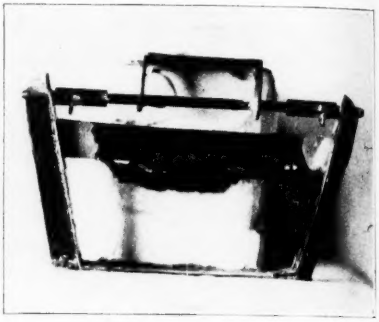

Fig. 22.—Back view of test articulator in mounting position.

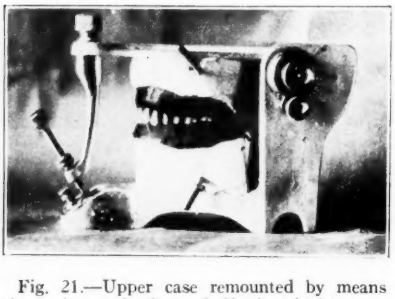

Fig. 21.—Upper case remounted by means of matrix on the lower half of articulator.

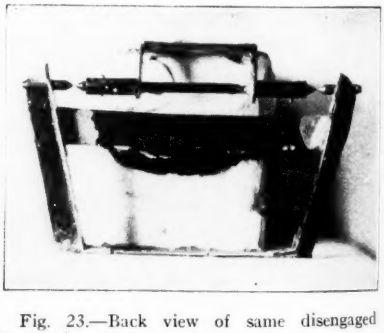

Fig. 23.—Back view of same disengaged for testing.

an end-to-end and occlusion the Curve of Spee should be flatter. Differences in slopes of the two condyle paths will also require slight readjustments to obtain balance on the two sides.

After the cases are tried in and are ready to vulcanize remove the lower from the articulator first. Then place plaster on the lower bow of the articulator and obtain a matrix of the occlusal surface of the upper teeth so that after vulcanizing the case may be replaced in the same position for final grinding in.

When the cases have been finished take two check bites one in central occlusion, and one in protruded occlusion by means of the plaster matrix mount the upper case (Fig. 21). Assemble the lower in central occlusion with the upper by means of the check bite and attach to articulator with plaster. Remove the central occlusion check bite and substitute the protrusive check bite and make any readjustments of the condyle paths necessary to allow the cases to seat accurately in the protruded bite.

MANDIBULAR MOVEMENTS AND ARTICULATOR DESIGN

By J. W. NEEDLES, A.M., M.D., D.D.S., Pueblo, Colorado

(Read before the National Society of Denture Prosthetists, Los Angeles, California, August, 1922)

IF WE wish to approach the problems of occlusion and articulation in a truly scientific spirit we must lay aside all questions of personality. Every observation and every theory must be subjected to the most exacting tests to determine its truth. Only those observations which unfailingly meet every test deserve to be accepted facts. Every theory to be worthy of acceptance must take account of and satisfactorily explain all of the known facts, and in addition, must be modified or enlarged so as to harmonize with every fact that may be established in the future. It follows then that any theory must be subject to constant change and modification, discarding those portions which are shown to be untrue and incorporating those facts which the future develops.

It is in this spirit that I wish to offer this statement of my present views regarding some of the facts and theories of mandibular movements. Further study and experiments have convinced me that some of my former views are untenable. With this statement I will take up some of the debated points.

The first one which I shall consider is whether there is lateral movement at the condyles. Last year I felt that this movement had been sufficiently well established. The tracings of the condyle path as given by Dr. Gysi were to my mind conclusive but since this movement was still questioned and since it entered into an articulator design, I wished to confirm it by another method. As the test bite seemed to be looked upon as a practical test for an articulator, I decided to apply the same method in studying this question. It requires consider-

able care to obtain test bites of sufficient accuracy for this purpose. This consists in using two pieces of base plate wax between which is interposed a layer of cotton fabric. If the wax is only slightly warmed very accurate bites are obtained. The models of several natural dentures were mounted with the face bow upon a measuring instrument which is similar to an articulator. The mandibular member is provided with a pointed pin on each side to indicate the center of the condyle. The maxillary member is also provided with cone points which can be held opposite those of the mandible while mounting the upper model in the central occlusal position by means of the central occlusal bite. The two parts of the instrument are then disconnected so there is no mechanical connection between the maxillary and mandibular members but the cone points of each member are exactly in line. Upon substituting the various test bites the relative change of position of the condyles with respect to the maxilla is easily apparent.

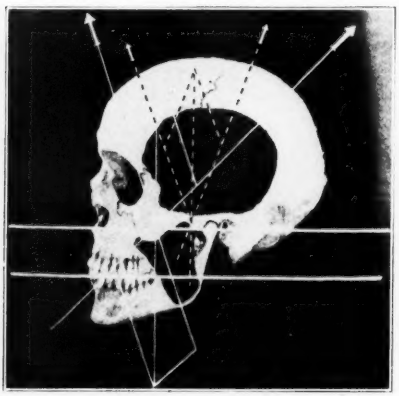

Fig. 24.—Drawing from George H. Wilson.

This method was applied to the models of several natural dentures. While the series of tests was not extensive enough to establish any new facts, it was sufficient to confirm all the movements already demonstrated by Gysi. It demonstrates very clearly that there is a lateral movement of the condyle toward the side of the working bite.

The next question is the amount of pressure at the respective condyles during mastication. This question is at the foundation of the leverage problem so much in controversy (Fig. 24). In chart 2 of Dr. Wilson's article he develops the idea that the resultant force of the muscles of mastication is the equivalent of a force at right angles to the occlusal plane applied at the distal side of the second molar. Let us grant that this correctly illustrates the conditions, which it can very well do. If the relative magnitude of the forces is changed the side of the parallelogram must be altered in proportion. This will result in a change in the magnitude of the resultant force and also a change in its direction, inclining it either forward or backward. If inclined forward it results in moving the point of application more backward

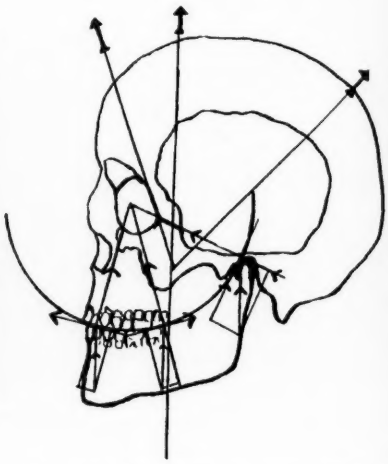

Fig. 25.—Modification of same drawing.

into the third molar region. If inclined backward the point of application of the force is caused to move toward the first molar.

Let us assume that the pull of the Masseter group of muscles is constant in magnitude and direction. We can readily see that merely changing the relative activity of the anterior and posterior fibers of the temporal makes a change of direction in its combined pull as well as in its magnitude. This produces a modification in the parallelogram of forces, and as we found before the resultant force changes in magnitude, direction and point of application. We must conclude then that the point of application of the combined muscular energy may be shifted forward or back within certain limit and that the direction and magnitude may also be changed by changes in muscle activity.

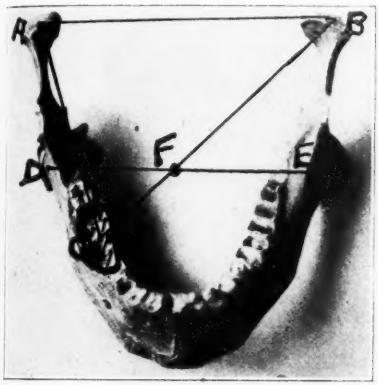

Fig. 26.—Mandible showing the distribution of forces with the bolus in the molar region.

Let us assume that Dr. Wilson's illustration truly represents average conditions and that the result of the muscular activity is a force applied in the second or third molar region being perpendicular to the occlusal plane. This force would act upon the mandible in parallel lines (Fig. 25) tending to move it bodily upward.

Let us study what effect this force would have at various parts of the mandible. We can do this most simply by eliminating the effect of the cusps of the teeth and considering that we have two spherical occlusion rims. The upward force in the incisal region would be resolved into a force perpendicular to the surface, and another force tangent to this surface tending to produce protrusion. The force in the molar region would also be resolved into a force perpendicular to the surface and a force tangent to the surface tending to produce retrusion. The two tangent forces being in opposite directions and about equal in amount would tend to balance each other. The forces perpendicular to the surface would both be directed toward the center of the sphere.

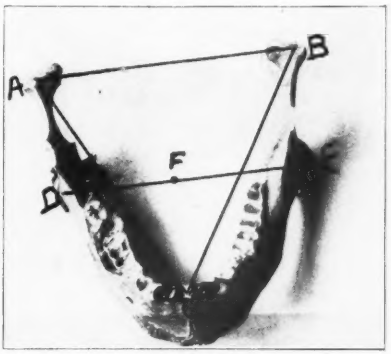

Fig. 27.—Same bolus in incisor region.

The vertical force at the condyle would also be resolved into two components—one perpendicular to the surface which would be directed toward the center of the sphere and a tangent force tending to produce retrusion.

The magnitude of the forces at these various points would be inversely proportionate to their distance from the cen-

ter of applied force. If there were no force applied at the condyle the two components described would also be zero. Under certain conditions which we shall study later, this force might even have a negative value.

This study so far has only considered one side of the head. If we consider both sides of the head at the same time we can develop many more facts. For this purpose I have taken a photographic projection of the mandible at right angles

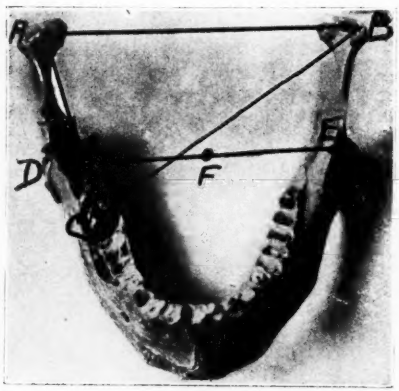

Fig. 28.—Same bolus in third molar region.

to the direction of the applied force (Fig. 26).

Let us consider that the muscular action is equal on the two sides. Then the center of the applied force on one side would be at D and on the other side at E which is equivalent to double the force applied at F. If the forces on the two sides were not equal the point F would move toward the more strongly acting side. The points D and E can be located either further forward or backward either singly or together. This results in quite a range of position for the point F which is the resultant center of the applied energy.

If we place a piece of lead at C so as to separate the teeth there could only be three points of support for the mandible; these would be at A, B and C (Fig. 26).

If the muscles were so coordinated that the point F fell outside of the triangle A, B and C, there would be a condition of unstable equilibrium with a negative force at A which would lift the condyle off from the articular surface (Fig. 28).

If by change of muscle coordination the point F were caused to move to the left so as to fall on the lines BC there would be no force of any kind at the

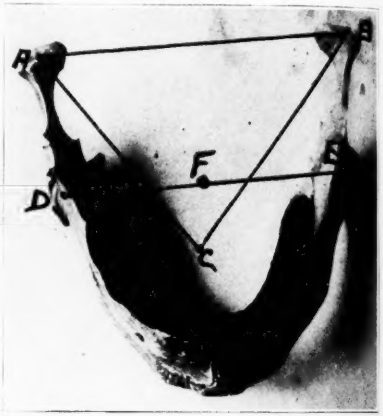

Fig. 29.—Resultant pressures of full dentures in central occlusion.

point A, which is the "Working Condyle." The force would be proportioned between the points B and C inversely as their distance from the point F (Fig. 26). Figure 30 represents the same conditions brought about by shifting point C forward.

In the various illustrations the point: A is working condyle; B is balancing condyle; C is center of resistance; D and E are centers of applied force on the two sides; F is resultant center of applied force (Figs. 26 to 30).

It is easily seen from the illustrations that the force at A the working condyle may be zero, or it may be positive pro-

ducing pressure on the condyle or negative lifting the condyle from the articular eminence.

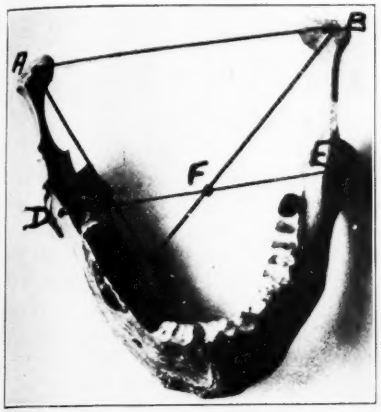

Fig. 30.—Same in working bite.

At B the balancing condyle, there is a positive pressure under all conditions. Any force at the condyle will be resolved

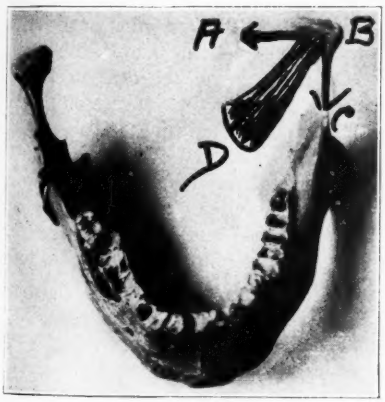

Fig. 31.—Components of action of external pterygoid.

into two component forces as previously explained, one perpendicular to the articular surface which produces a certain degree of compression in the fibrocartilage. The other component will be tangent to the surface producing a retrusive movement of the mandible. It is thus apparent that the mechanism of the upper part of the joint is essentially a lubricated inclined plane upon which the articular fibrocartilage slides.

This serves under the stress of mastication as a very efficient means of converting a part of the vertical stress into a force which carries the mandible back to central occlusion.

Thus we see that this component is

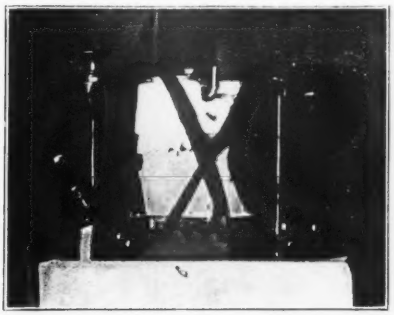

Fig. 32.—Rubber bands in position on articulator to show the combined action of masseter, internal pterygoid, and temporal.

the active force which brings the mandible back to central occlusion from any possible position. It is therefore opposed to the action of the external pterygoid (Fig. 31).

By studying the direction of the fibers of the external pterygoid it is apparent that the contraction of this muscle on one side would produce protrusion to the opposite side and also a lateral shift of the mandible toward the working side.

By placing elastic bands in the position shown in Figure 32 so as to represent the actions of the muscles of mastication all of these conditions may be roughly demonstrated.

If these conclusions are at all justified

it is apparent that the articular surface of the glenoid fossa is the guiding element of the protrusive and lateral movement of the mandible. The condyles can only approach this surface more closely by compression of the fibrocartilage which is only possible to a limited extent. Certain conditions may result in lifting the condyle on the working side from the articular surface to the extent allowed by the ligaments. With these exceptions, the form of the articular surface controls the path followed by the condyles in mastication. Therefore we must be able to adopt the condyle path of the articulator to those of the patient. This brings us to the consideration of a definition of central occlusion.

If we understand that the condyles are in contact with the fibrocartilage and these in turn rest upon the articular surface of the temporal bone, and there is no lateral displacement of the condyles, the position of the incisal point will determine the relation of the mandible to the maxilla. Therefore in natural dentures it is only necessary to define the position of the incisal point for central occlusion. We might define central occlusion as that position of the mandible to the maxilla that exists when the incisal point of the mandible is in the median line, and retruded to the position of closest approximation of the mandible to the maxilla. This results in the maximum contact of the occluding surfaces of the upper and lower teeth. The condyles will then necessarily be in central occlusal position.

In edentulous cases the correct position of the incisal point can only be established by defining the position of the condyles. It is necessary then to consider if retrusive occlusion is possible and to what extent it may exist in a given case. The central occlusion will then be obtained when the condyles are forward of their most retrusive occlusion by this amount. A change in the distance between the jaws for a short range will not materially change the position of the condyles. Therefore we may choose the opening which we consider best for that case. In practice it may be considered that central occlusion is established when the incisal point is at the the apex of Gysi's gothic arch. But if for therapeutic reasons we wish to change the positions of the condyles, the incisal points may be placed at any point within this figure and the teeth so adjusted as to tend to maintain this position, thus creating a new central occlusion so long as the stability of the dentures and the interlocking of the cusps is sufficient to resist the tendency to return to the normal central occlusion.

There is quite a difference of opinion as to how nearly it is necessary for an articulator to reproduce the movements of the mandible. If we admit that the condyle path is controlled by the form of the fossa and there is a positive pressure at the moving condyle we cannot deviate from this condition in the articulator. The opening movement however, is independent of the oscillatory movement and exerts no influence on the path of the condyle within the range of occlusion. Therefore we may combine these two movements in any ration we desire. This allows the use of any cusp depth desired and in this particular we may depart from nature in order to attain mechanical efficiency.

The Curve of the Spee

If the condyle path is tangent to the Curve of the Spee or to a concentric circle, spherical bite rims may be moved in any direction and remain in contact throughout their surface (Fig. 9).

If the inclination of the condyle path is steeper than this tangent, protrusion will result in separation of the bite rims at the heel (Fig. 7). If the inclination

of the condyle path is less than that of the tangent, protrusion will result in separation in the anterior region (Fig. 8).

If the first condition exists the cusp length and the overbite must be strictly in accordance to Bonwill's drawing. If the second condition exists the cusp length at the back must be greater in proportion to the overbite. If the third condition exists the overbite of the anteriors must be greater in proportion to the cusp length in order that balance may exist.

Therefore with a given cusp depth of the second molar, if we wish a greater overbite of the anteriors we must make the Curve of Spee of a smaller radius. This will require a more rapid increase of cusp depth from front to back. If we wish to diminish the overbite we must flatten the Curve of Spee, thus decreasing the difference in cusp depth from back to front.

This shows why we can gain a balanced contact in cases with a deep overbite by setting the second molar at a steeper angle.

In natural dentures with marked retrusion there is generally a very deep overbite. If these cases have a flat condyle path it may still be possible to have a balanced occlusion in protrusive position. Thus we have a steep Curve of Spee with a flat condyle path showing that the Curve of Spee is not a guide to the steepness of the condyle teeth.

The Curve of Spee is then truly a compensatory curve dependent partly on the ratio of cusp length to overbite and partly on the slope of the condyle path to produce a balanced occlusion.

By the use of spherical bite rims I have found in practice that the lateral and protrusive movements approximate very closely movement about the center of a sphere. A satisfactory method of recording the mandibular movement is to use bite plates having spherical bite rims with three points projecting from the surface of the upper rim (Fig. 15). These trace a record of their movement on the surface of the lower bite rim (Fig. 16). If the rims are in contact in central occlusion the pins will cut to their full depth at this position. But if they separate at any point in any of the other occlusal positions this fact will be recorded by one or more of the pins not cutting to full depth. This then makes it possible to adjust the articulator to the proper condyle paths and to establish the proper rotation centers or what is equivalent, the proper incisal path.

The same results can be obtained by means of a wax bite in central occlusion and in lateral occlusion on each side. The only difference being that we can not be so certain that we have the correct central occlusion.

Both of these methods compensate at least in some degree for errors of accommodation. The compressibility of the tissues under the bite plates and the elasticity of the fibrocartilage are corrected for under what approximates working conditions.

In using test bites as a means of determining the accuracy of articulator movements, if the casts are mounted rigidly on the instrument, it is very hard to tell if the casts go accurately to place in the test bites. For this reason I devised a method of mounting the casts so they could be easily separated from the articulator. This allows the same casts and test bites to be used on various instruments. By leaving the lower cast attached firmly to the articulator and separating the upper one from the articulator bow, it is possible to seat the upper cast in the bite unrestrained by the articulator mechanism. If the articulator is capable of reproducing the recorded movement, the plaster base attached to the upper bow could be brought into exact opposition to the base of the upper cast.

Since the base of the cast is smooth with three positioning notches cut in it, any error of movement is more readily detected than it is in the complicated bite surface (Fig. 33).

With these modifications I believe the test bite method affords a very accurate means of testing articulators (Figs. 34 and 35).

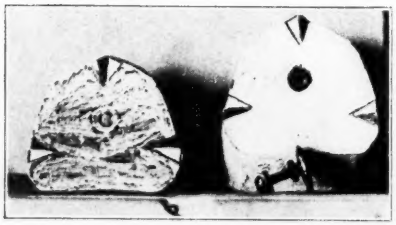

Fig. 33.—Method of preparing models for testing articulators by test bite method.

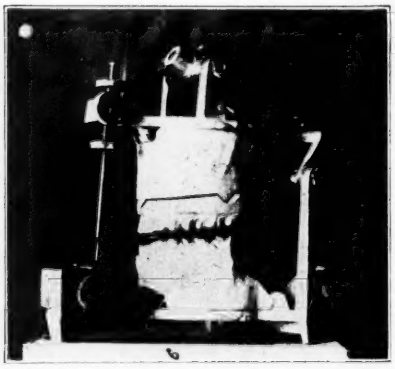

Fig. 34—.Error produced in articulator by placing the center of sphere (universal joint) too low. Radius too small and Curve of Spee too acute.

Conclusions

1. There are two fundamental joints between the mandible and the maxilla. The one a hinge joint with the axis through the heads of the condyles. The second a sliding joint between the fibrocartilage and the articular eminence. Any movement of which the mandible is capable is the result of movement, in one or both of these joints. Therefore there are but two elemental or component motions. The movement at the condyle is variable as to degree of angular movement. The movement at the fibrocartilage is variable both as to direction and magnitude.

If these two elemental motions are combined varying both the direction and magnitude an infinite variety of movements is produced.

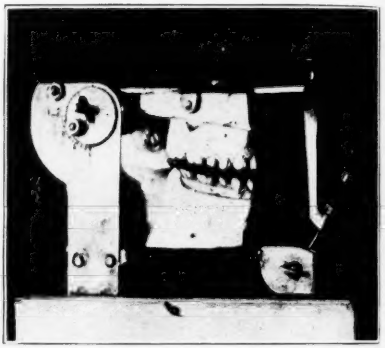

Fig. 35.—Perfect adaptation obtained by correct adjustment of condyle slope.

When the movement of the incisal point and the two condyles are referred to, a recti-linear system of axes or a monoclinic system of axes as done by Mr. Hanau, the coordinates expressing these relations, may be called component motions. This may be of value for descriptive purposes, but strictly speaking there are but two component movements, (disregarding the fact that the condyles may also be intruded or lifted).

2. There is one principal axis for lateral movement on each side which corresponds to Gysi's rotation center.

3. There are an infinite number of axes for movements intermediate between those of incision and working bite.

4. If the slopes of the condyle paths on each side are symmetrical, all these axes may pass through a common point. This is the foundation for the spherical theory.

5. If the condyle slopes are not symmetrical, the two principal axes will not pass through a common point, and in this respect the spherical theory is untenable.

6. It can be experimentally proven that in general the axis for working bite does not pass through the condyle but through some point behind the condyle. This requires lateral movement at the condyle as well as vertical and anteroposterior components.

7. It can be demonstrated that there is always pressure at the balancing condyles and generally a lesser degree of pressure at the working condyle.

8. Therefore the articular surface of the glenoid fossa is a guiding surface of mandibular movements. The slope of this surface varies in individuals and on the two sides of the same person.

9. Hence it is necessary to have a similar guiding mechanism in an articulator, and it must also be independently adjustable on the two sides.

10. The ratio between the (opening-closing) movement and the (lateral-protrusive) movement may be changed at will. Therefore any depth of cusp and overbite may be chosen for a patient.

11. Central occlusion may be defined by the position of the incisal point or by the position of the two condyles. For this reason the incisal tracing alone will determine central occlusion. The wax-bite method of adjustment compensates for errors of accommodation.

12. The Curve of Spee is purely a compensating curve relating to the depth of cusp and overbite, and to the condyle slope.

13. The first, third, fourth and fifth of Gysi's specifications must be embodied in an anatomical articulator. The portion of the path used while teeth are in occlusion is practically straight.

14. Dr. Monson's tests are acceptable if very accurately applied.

15. Mr. Hanau's nineteen conclusions are acceptable in principle with but slight modification.

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NOTES RELATIVE TO ART IN DENTISTRY

By H. C. STEVENSON, D.D.S., Colorado Springs, Colorado

(Read before the Colorado State Dental Association, Troutdale-in-the-Pines, Colorado, June 14, 15, 16)

CIVILIZATION advances only in proportion as man learns to control and to utilize the forces and elements of nature. Each new discovery in the various sciences brings more comfort, ease, pleasure and efficiency to mankind; and I feel free to say that the wonderful achievements of modern dental surgery, both in efficiency and in art, and with their beneficent effects upon the human body, have advanced our profession to a recognized position of importance of which we may well be proud.

But it was only after many years of struggle that we were accorded what we consider our proper atmosphere. We have lifted ourselves from a position of relative unimportance to one of consequence and dignity. We make no obeisance to anyone, no apologies for our attainments, and we are cognizant of an ability to exist and to progress as a mighty and learned profession because of those attainments, and without the necessity of claims upon the other branches of the healing arts. We stand on our own feet, proud of our own part in the world's progress.

We may well consider dental surgery under three general principles, viz: Health, Efficiency and Art, each of relative importance in the order named. I wish to speak at this time more particularly of art because I feel that this great component of good dentistry is not receiving its full share of consideration.

Art may be defined as the highest interpretation by the cultured mind of things in their reality, and manifested by practical, physical skill.

> "Oh, noble tool; Enraptured Mind
> Which fashions all in art,
> What could the hands alone impart
> Unless thou first defined?"

In a broad sense the term art refers to anything which is not an immediate product of nature, but is artificial and done by the aid of human skill. The term is commonly used to designate skill in performing some special kind of work, either mental or physical. The arts may be classified into the useful or mechanical arts, those which are intended to produce material results, and fine arts, those which are intended to give pleasure. The mechanical or industrial arts may be practiced by anyone who has acquired skill, but the fine arts may be successfully practiced only by those who have genius or talent as well as skill. A third classification is termed liberal arts. Art in dentistry is confined to a combination of the two former classifications, but we must understand and realize that dental surgery of this age is not merely artful mechanics, but a combination of art, mechanics, surgery and medicine, preceded by intelligent diagnosis. Well might we say with Ruskin: "While manufacture is the work of the hands only, art is the work of the whole spirit of man."

The world has produced only one Raphael, one Michael Angelo, one Beethoven. But how infinitely richer

we are because of them. They ever have been and ever shall be a scintillating star of inspiration to those whose ambition in the arts is great and boundless. The pupils who have striven to emulate the work of the masters have not only enriched themselves thereby but they have, through the agency of such inspiration, succeeded in giving to people generally greater results than would have otherwise been possible, had their inspiration been less lofty or had been unknown or incomprehensible to them entirely.

And so the work of the masters in all the arts is reproduced and improved by the pupil, generation after generation, contributing more and more to the joy and to the welfare of others.

So it is in dentistry! We cannot all be masters, but if we are to continue to improve and to advance we must adopt more of the modern ideas and principles of practice which the thinkers and therefore the leaders of our profession give us.

What then, does art demand of us as a profession? Since art as applied to dentistry is in a great measure constructive, it is therefore predicated on the proposition that the construction or restoration contemplated be first conceived or interpreted mentally in the ideal and then executed by practical, physical skill so as to simulate nature to the closest possible degree.

There is probably no operation in the mouth in which art is not a consideration, but it becomes more particularly so in those operations called restorations.

Since dental surgery, today, may not be saving as many teeth as formerly, but is saving more systemic disease and more lives, we are immediately attracted to the different methods which may be used to substitute others for them; and with them has come an impetus for results which more nearly approach the ideal.

Let us consider first the full denture, and the trepidation with which most patients contemplate the result. The fear of a change in expression is one which we all hear constantly, and such fear is well founded if we will but recall how comparatively few dentures are natural in appearance. What is more repulsive to refined and delicate senses than a denture that is at once discerned to be artificial because the teeth are either too large or too small, too light or too dark, or not of a form nor placed in proper positions to really harmonize with the facial form? A thing of beauty is a joy forever, but in the mouth we must have efficiency, comfort and durability in addition. We should endeavor to hide such defections from the normal as the loss of the natural teeth, instead of so boldly displaying them by availing ourselves of "art in dentistry."

With the possible exception of the eves there is no part of the human face so capable of expression as the mouth, yet there is no part so frequently mutilated and distorted. It is therefore our duty to study the laws of facial form as well as the laws of harmony and symmetry in their many aspects as they pertain to the mouth and face, so that character and expression as reflected by the individual shall not be changed or if already changed or lost, being edentulous, that they may be correctly and artistically restored.

Many methods have been suggested and demonstrated from time to time concerning the recording of profile, the fullness of the lips and other such measurements of the face before the extraction of the natural teeth. In my opinion, one or several such records should be made if we expect to make substitutes that will least change and mar the character of the face. Trubyte and other similar teeth have permitted us to more nearly approach the ideal in restorative work of all kinds than any that have heretofore been at our command, and these, together with correctible impressions and scientific articulation, permit

of dentures far in advance of most of the best of former times.

Art as applied to dentures need not necessarily indicate a perfect alignment of the anterior teeth, for at times a more artistic result is obtained by slight irregularities in their positions, and at other times by following out in the substitutes, the positions formerly assumed by the natural ones. Individuality should be incorporated into all such work and stereotyped results avoided.

Passing to bridgework, we are confronted with similar perplexities, and are handicapped and limited, ofttimes, in our freedom of choice and execution by the positions and structure of the remaining natural teeth. The first essential for an esthetic anterior bridge is an abutment exposing no metal to the eye. I am aware that an attachment of this kind can have no universal application, different conditions requiring various ones, but by the use of the so-called pinlay or pinledge, especially in the shorter bridges, it is possible to attach a bridge which exposes absolutely no gold to the view, causes not the slightest irritation to the gingival tissues, and one that is strong and durable. An experience of several years prompts me to support the use of the pinlay as an attachment in preference to the Carmichael, first because there is no part of it exposed, second, it requires less cutting of the tooth structure, and third, it is quicker of execution. But of all, the artistic properties which it possesses appeal most. The custom of some to protect the incisal edges of facings with a projecting tip of gold at once indicts the restoration as being artificial, and a much more natural and artistic result is obtained by omitting the tips and risking the fracture of a facing, which is in any event not a serious problem and one of infrequent occurrence.

Teeth, as now supplied by the manufacturers in the three typal forms with their many modifications and with better shading, constitute a decided advance over other haphazard ones, and it is less difficult to select teeth which beautifully harmonize with the facial contour and complexion. Yet, there are times when changes in shade and form seem desirable to meet certain existing or abnormal conditions; therefore the electric furnace is almost indispensable. In cases showing excessive shrinkage of the tissues, and the teeth to be supplied are necessarily much longer gingivally than the others in close proximity, a great improvement is achieved by the baking on of a gum frit to the gingival portion of the facing to a depth equal to the shrinkage or on a line harmonizing with the adjacent teeth. Wear and tear, abuse or unusual discolorations can also be reproduced in like manner and to the particular patient these little added touches of art in dentistry mean much.

Without bringing into this discussion the relative values of the various filling materials, I wish to condemn, from an artistic standpoint the use of amalgam in any but the most inconspicuous positions in any teeth, and it is most unbecoming to use it at all anterior to the molars. I realize that many of our patients proclaim against the gold inlays, especially if large, in the posterior teeth, requesting amalgam instead, making the statement that the latter is far less conspicuous and glaring than the former. The instances are legion in which the dentist has mistaken at first glance, an old discolored amalgam filling for an advanced cavity. How much more often, then, will others seeing teeth with many such fillings with the consequent discoloration of the tooth structure form the instant opinion that they are cavities instead of fillings? Yet had these same teeth been filled with gold, the same view would have immediately communicated the fact that the teeth had been filled and most likely well cared for.

Therefore, as I see it, gold fillings in the posterior teeth where porcelain is contraindicated are more suggestive of proper dental attention, and they cer-

tainly present a more pleasing result and higher esthetic value than amalgam, regardless of well established objections to the color of the gold. But if we must at times place amalgam fillings, let us not consider that operation well done unless it receive the same care in its toilet as all other similar ones receive in using other materials.

Then we must consider the marvelous changes wrought by the hands of the skilful and intelligent orthodontist. To me, he is a wonder worker. Behold, how he takes the child with irregular teeth and malformed face, often repulsive, and gradually but gently brings those teeth into a line of normal occlusion, and at the same time shaping and molding the face into one of beauty. This is the highest form of art. The orthodontist must have an appreciation of art little dreamed of by many of us. He must possess a keen conception of the laws of harmony and of art in general, but especially in their relation to the human face; for each face is a law unto itself. All faces are much alike, yet they all differ; just as there are many types of ideal faces but no one of which can be designated the ideal type. Therefore, the orthodontist must interpret and picture in his own mind the ideal for each face before him, and with his practical, physical skill mold it into one of pleasing symmetry.

The periodontist also contributes to art in dentistry when by his skilful work he provokes a change from an unsightly, red, swollen, irregular, pus contaminated mucous membrane to one pink, firm and regular—one that presents the glow of health.

There are so many ways, so many little artistic touches that can be given teeth, to improve the general character of the mouth and face, if we will but train ourselves to recognize them. It is really astonishing at times to note what an improvement ensues from such a simple thing as the shortening by grinding and polishing of an elongated tooth, restoring it to an artistic harmony with its fellows. That the disfiguring effects of the so-called "Colorado" teeth can be in some measure overcome, there seems no doubt, although this regrettable condition is not one that easily lends itself to great improvement.

And so we might go on with other phases of art as related to dentistry, but I am also making a plea for better dentistry. If there be any tendency to let any operation leave our hands without an effort being made to make it perfect, then are we not only doing the patient an injustice, not only doing ourselves an injustice, in addition but we are contributing to the discomfiture and slackening the progress of the whole personnel of dental surgery.

Conversely, the more perfect the work of the individual dentist, the more his work pleases and promotes the health, comfort and efficiency of his patients, the more he contributes to the honor and progress and dignity of the profession.

Permit me to say that modern and efficient services can be rendered only by those who love "art for art's sake," by those whose ideals are ever higher and higher and by those who wish, above all, to render conscientious services. Dentistry will continue to improve, for the best is not yet good enough. Those who appreciate the better things of life will demand this better dentistry, and the dentists with a vision of art will incorporate it in their work and supply it.

THE REPLACEMENT OF MISSING TEETH BY MEANS OF BRIDGEWORK

By HART J. GOSLEE, B.S., D.D.S., F.A.C.D., Chicago, Illinois

(Read before the Illinois State Dental Society, Decatur, Illinois, May 8-10, 1923)

THE replacement of missing teeth by means of bridgework of any type is always a problem of serious portent. It is so because it means that the remaining teeth, or the environmental tissues, or both, must assume the burden of restoring the function of the missing unit, or units, and that this burden must be assumed in addition to the requirements incident to their own normal activities.

And, as the extent of impairment and the degree of additional burden increases in proportion to the number of units which must be replaced, an intrinsic value should be placed upon each and every single unit in the normal denture.

A recognition and an appreciation of these important considerations always should encourage a conscientious effort to avoid impairment of normal function or overburdening remaining teeth, and, thus, to contribute to health, to comfort, and to longevity by conserving the natural teeth.

The maintenance of normal conditions and the conservation of health, therefore, place a responsibility upon the shoulders of all who are honest and conscientious; and this responsibility should encourage an effort to save the natural teeth under all favorable conditions and at all times.

And yet, however zealously such effort may be made, until such time as preventive dentistry shall have become a realization, teeth will be lost.

They will be lost as they have been lost, because of neglect, disease, or accident, or by virtue of the ravages of time and use, habits and foods, and largely because of failure to recognize and appreciate their value.

When they are lost from any of these causes they must be replaced, and the replacement must be made in a manner which will cause the least injury to the remaining natural teeth, and which will insure the maximum of efficiency and of permanency in the restoration of function. The replacement of missing teeth, therefore, is an art which occupies an important place in the field of prosthetic dentistry.

Previous to the advent of the specialty of crown and bridgework, missing teeth were supplied by means of partial dentures made of gold or silver, and later of vulcanite, covering the hard palate, or the underlying tissues, and retained by adhesion only.

The introduction of clasps followed. This means of retention was such an improvement over adhesion alone that the supporting base was made smaller and smaller. It soon was discovered, however, that partial clasp dentures or clasp fixtures, were injurious to the crowns of supporting natural teeth, and the base itself, irrespective of its size, was injurious to the health and normal relationship of the gingival tissues around the remaining natural teeth.

Then came a resurrection of the ancient method of supplying missing teeth by attachment to remaining natural teeth and the introduction of modern fixed bridgework followed. This method of supplying missing teeth seemed to offer so many features of advantage over former methods that it soon came into

general use, and was often applied indiscriminately.

The possible advantages of supplying missing teeth by a fixed attachment to remaining natural teeth, and of avoiding, thus, the wearing of any type of removable fixture—which appealed at once to the wearer—were buried soon under an avalanche of indiscriminate and injudicious application.

The irreparable injury done to good, sound teeth, together with a failure to observe the requirements of health, hygiene and sanitation could be expected only to result in failure. And, notwithstanding the myriad of methods and devices which were introduced from time to time, failure was recorded in a large percentage of cases.

As a means of obtaining increased opportunities for an observation of the important requirements of health, hygiene and sanitation, the introduction of removable bridgework followed, and innumerable methods and devices for the construction of fixtures of this type also have been presented from time to time.

Both fixed and removable bridgework have passed through the experimental stages. Each method has done much damage and caused the loss of many good, sound teeth. The failures, however, were to be attributed more largely to over-enthusiasm, to indiscriminate application and to faulty technic, rather than to incorrect principles.

Fixed Bridgework

The possible advantages to be obtained from the replacement of missing teeth by means of a fixed attachment to remaining natural teeth were recognized early.

"Teeth without plates" became a psychological magnet, and many were carried away on a wave of enthusiasm. As a result, all other methods of replacing missing teeth, except in the edentulous cases, were forgotten temporarily by many, and the virtues of fixed bridgework were championed and extolled to a point beyond the limitations of reason.

Those were pioneer days, however, and the methods were pioneer methods. The application met with varying degrees of success and failure.

Some, over-enthusiastic, used fixed bridgework to the exclusion of all other methods. Those who did soon encountered failures. The more conservative, however, soon recognized possible disadvantages, and possible reasons for failure. They made an effort to eliminate or to minimize both and to use this method—not to the exclusion of all other methods—but where it seemed to be a rational procedure.

Others who were less analytically inclined were so influenced by the percentage of failures as to become discouraged, and, ultimately, to criticize and even to condemn fixed bridgework in whole and in part.

The criticism and condemnation, however, has been productive of much good, and has reacted in such manner as to revolutionize former methods of practice and to place the skilful application of modern fixed bridgework in its proper place as one of the useful methods of replacing missing teeth.

The use of fixed bridgework to the exclusion of all other methods of replacing missing teeth was a practice that justified criticism and condemnation.

Like any other one method of procedure, this method is not applicable universally. And, like all other methods that may have an elastic range of application and a fertile field of usefulness, it has been abused. And when any method is abused by indiscriminate and overzealous application, criticism must follow, and condemnation often is warrantable.

Heretofore, fixed bridgework has been a mass of empirical methods applied indiscriminately. Possible injury to the supporting natural teeth, and the requirements of hygiene and sanitation have been largely ignored. Both considerations are always vital issues. The conservation, promotion, and maintenance of

health must be the fundamental consideration in the replacement of missing teeth by any method.

And the application of any method which does not involve and include favorable possibilities in these directions is to be regarded as approaching the borderline of malpractice. In the application of fixed bridgework, therefore, the conservation of the health of the supporting natural teeth is the first consideration, and hygiene and sanitation follow closely as basic requirements.

A certain amount of injury to the supporting natural teeth must follow the replacement of missing teeth by any method. But unless the partial immobilization of the supporting natural teeth which follows the application of fixed bridgework, in itself is absolutely detrimental to the health and vitality of teeth so treated, then no greater injury results, necessarily, from one method than from another.

Fixation as a Principle

It has been my privilege to state previously that the "fixation," or the partial immobilization of natural teeth which follows the application of fixed bridgework, is a consideration of importance, theoretically and physiologically, because nothing quite analogous is attempted, or, in so far as is known, is tolerated by nature.

Biology teaches that "the function of normal tissues in organs at work cannot be violated seriously, without impairing the vitality of the organs involved." In the partial immobilization of the natural teeth, the normal functioning movements are restricted necessarily, and, to a degree, an abnormal condition is established. But whether the limited restriction of movement, or the establishment of a condition which is not physiologically ideal, will invite or produce a pathological condition is doubtful, and so far is not proven by clinical evidence.

It is true that nature does not tolerate absolute fixation, or absolute immobilization of any tissues in the body which move in functioning, and that where this condition obtains indefinitely, degeneration and atrophy follow. And it is true, too, that all movable tissues require a certain amount of exercise and stimulation in order that health may be promoted and maintained.

Also, it is true that the teeth move in functioning and that a reasonable amount of exercise and stimulation is essential to the health of their investing and environmental tissues. And it is also true that inflammation begins with stasis, and that prolonged stasis of circulation at any given point will be followed by degeneration and atrophy.

These biological principles apply to the teeth as well as to other tissues, and, doubtless, would obtain and follow in sequence if the teeth were to be, or if they could be, immobilized absolutely and permanently. But the teeth are not entirely analogous with any other tissues in the body. They are cushioned peculiarly by their investing tissues, and they are cushioned in such manner, and by tissues of such character, and of such tolerance, as to make complete and absolute immobilization practically impossible.

As a strictly hypothetical proposition: If the full complement of teeth in either arch were to be banded first as single units, and if the bands were assembled into one major fixture, and this fixture then cemented to place upon the teeth, absolute fixation, or complete immobilization would not obtain. Some movement, even though restricted and limited, and far from normal, would be possible because of the character and resiliency of the investing tissues.

A lowered tonicity and resistance of these tissues would follow, of course, but, as long as some degree of normal functioning activity was possible, pathology would not be invited, necessarily.

Therefore, if complete and absolute immobilization of the teeth practically is impossible, and if the investing and environmental tissues will tolerate partial immobilization, then fixed bridge-

work is a rational and useful method of supplying missing teeth. Its application often may be indicated as the choice of evils, or as the lesser evil.

Clinical evidence extending over a period of many years indicates, beyond a reasonable doubt, that the degree of immobilization which follows the application of well designed, and well-built, and properly adapted fixed bridgework does not condemn teeth, necessarily, nor condemn the vitality of their pulps, nor invite pathology.

And it is noteworthy to observe, too, that pulpless teeth are tolerated under these conditions quite as well as are teeth having vital pulps; also, that partial immobilization instead of insuring an impairment of the vitality and usefulness, and the ultimate loss of teeth so treated, on the contrary, frequently adds to their usefulness and longevity.

Indeed, teeth which have lost the support and protection previously afforded by adjacent and opposing teeth, where the investing tissues are not pathologic, but are of low tonicity, and where usefulness and comfort are negative, often may be made comfortable and serviceable for many years by stabilizing them. In many instances of this kind partial immobilization is not only *not* injurious, and not destructive, but is a positive restorative measure.

Therefore, while it cannot be claimed that a physiologically ideal condition follows the application of fixed bridgework, and while it is apparent that a semi-, or a quasi-abnormal condition obtains, still it is evident that nature does and will tolerate a partial immobilization of the natural teeth, and that teeth so immobilized, with all other conditions made favorable *may* and *do* remain healthy and serviceable for many years.

Like collateral circulation, and like the accentuation of the remaining senses following the loss of one, and like many other physiological phenomena, these clinical truths afford only another evidence of the resourcefulness of nature.

Advantages

In the replacement of missing teeth by any method the aim should be: first, to obtain a maximum efficiency in the restoration of function; and, second, to obtain this maximum of efficiency with a minimum of injury to the supporting natural teeth.

Functional efficiency increases with stability and decreases with mobility. Hence, in proportion as any type of restoration is stabilized in functioning, its efficiency will be increased. Absolute fixation, therefore, insures the maximum of stability.

In addition to the important feature of increased efficiency, the modern methods of attachment require less destruction of the supporting natural teeth for fixed bridgework than is required for any type of removable bridgework, other than clasp fixtures.

Indications

Fixed bridgework is indicated and may be used successfully whenever the application may be made under favorable conditions and within reasonable limitations. Favorable conditions mean that health must obtain, primarily, in all teeth which are to be used as abutments, and reasonable limitations mean that a knowledge of the basic laws of mechanics, or of dynamics, in particular, must obtain, and must be applied in each and every case. Irrespective of how well fixed bridgework may be built and adapted no case will be successful unless sound mechanical principles are observed throughout its construction and application.

The ideal and most typical indications for the use of fixed bridgework embrace: first, those cases where only a few teeth are to be replaced in a single fixture; and, second, those cases where teeth of similar functional activities are involved in the same fixture.

While it is not imperative that teeth of similar functional activities should be involved and included in a single fix-

ture, a more typically physiological condition obtains; undoubtedly, whenever the normal functioning movement of the supporting natural teeth is restricted to a minimum extent, rather than to a maximum extent.

The distribution of the abutment teeth is important, and, usually, the number of abutment teeth should be equivalent to the number of missing teeth to be supplied. This rule is not imperative, however, because the strength of the abutment teeth in their relation to the requirements of stress is the controlling factor in all cases.

Clinical evidence proves conclusively that the teeth will withstand and will tolerate a burden of stress in excess of normal functional demands. But the extent to which they may be expected to assume this additional burden, and the duration of expected toleration, must be within the limitations of reason.

Removable Bridgework

As a means of combining the replacement of missing teeth with the restoration of lost tissue, and with an observation of the highest physiological and sanitary requirements, removable bridgework has a field of usefulness, and is an art which demands and develops a high order of dental engineering skill and craftsmanship.

Because of the recognized importance of oral hygiene and of the ever increasing demands of prophylaxis, the psychology of removable bridgework is almost magic. And yet, while any effort which is directed toward, or which will aid, in the promotion and maintenance of health is progressive and constructive, and is essential to successful achievements, removable bridgework is not a panacea for all of the ills which are attached to the replacement of missing teeth by other methods, nor is it the only rational method of procedure.

In the replacement of missing teeth in all excepting edentulous cases, all methods of procedure are but a choice of evils, and all require or result in more or less injury to the supporting and remaining natural teeth. And the application of removable bridgework demands primarily and results eventually in quite as much mutilation and injury as does any other method.

As an intermediary method between fixed bridgework and clasp fixtures, however, it is a useful method of procedure. Fixtures of this type are more sanitary than fixed bridgework, though less efficient in the restoration of function. But they are often more efficient and less of a mechanical incumbrance than clasp fixtures.

Removable bridgework constitutes an assemblage of abutment and retaining attachments, and embraces that type of construction in which the body of the fixture which supports the missing teeth and restores lost tissues rests firmly upon the edentulous mucosa, and is held in position by means of retaining attachments which are supported by the abutment teeth.

This type of construction is not the product of modern development. To a large extent, it is the heritage of misapplied and unsuccessful fixed bridgework, and the outgrowth of a recognition of the limitations of fixed bridgework, and of the ever increasing and more exacting demands of sanitation.

During the evolutionary and developmental stages of removable bridgework, the art of supplying missing teeth has been "revolutionized" many times by the introduction of "new" forms of retaining attachments. At the time of the introduction, most all of them were heralded as a revolutionary method of procedure, applicable universally. Most of these were soon abandoned without seriously retarding the progress of dentistry. Many have been forgotten, and none were, or are, applicable universally.

Removable bridgework is a useful method of procedure in proportion as the indications for its use are favorable, and as the application may be made skilfully. But unless the indications are

favorable, and unless all of the operative and mechanical details of construction are observed minutely and executed skilfully, removable bridgework will do as much irreparable injury to the supporting teeth and to their investing tissues, as will result from the use of any other method of replacing missing teeth. And it is probable that quite as many good sound teeth have been lost through the indiscriminate and unskilful application of removable fixtures, as have been lost because of the similar application of other methods. Hence notwithstanding its advantages, it is not to be regarded as a universal method of procedure.

Advantages

When used with intelligent discrimination and good judgment, however, and when built and adapted skilfully, removable bridgework possesses many features of advantage. These are to be enumerated as follows:

First, the replacement of missing teeth may be combined with the restoration of lost tissue in a manner which subscribes to the highest requirements of sanitation.

Second, the normal functioning activity of the abutment teeth is restricted to a minimum extent only.

Third, a minimum of contact with the mucosa, and a minimum of mechanical incumbrance is required.

The first advantage enumerated is an important consideration, because when the replacement of missing teeth, and the restoration of lost tissues is demanded, every opportunity for affording and for insuring sanitation must present in all cases.

The second feature of advantage is important also for the reason that, especially in large fixtures, a more physiologically ideal condition undoubtedly obtains when the replacement and restoration may be made in a manner which will not interfere appreciably with the normal functioning movement of the supporting teeth.

And the third feature is also important because a minimum of mechanical incumbrance is desirable at all times, and in all cases.

All of these features are to be obtained from the use of well designed, well constructed and well adapted removable bridgework, and when indicated, no other method of procedure offers quite the same opportunities, or answers quite the same purposes.

Indications

Generally, removable bridgework is indicated whenever fixed bridgework is contraindicated, or specifically, whenever fixed bridgework is contraindicated, some type of removable fixture is demanded. Indications for the rational use of removable bridgework embrace the following classes of cases:

First, in cases where the number of missing teeth to be replaced greatly exceeds the number of remaining natural teeth which may be used as abutment teeth.

Second, where the distribution of the abutment teeth is unfavorable to the mechanical requirements of a fixed structure.

Third, where the restoration of lost tissue demands the use of a saddle, and where the requirements of sanitation demand a removable fixture.

It is somewhat singular to note that some of the most enthusiastic advocates of removable bridgework at the present time seem to ignore the larger field of usefulness which embraces bilateral fixtures, and the replacement of many teeth, and confine the application of small unilateral fixtures only, and to fixtures where but little if any restoration of lost tissue is demanded.

A large percentage of fixtures of this type, irrespective of the method of attachment used, or of the ingenuity displayed in construction, would be more efficient and more permanent restorations if they were converted into a fixed bridge, and cemented to the supporting abutments.

Requirements

The successful application of removable bridgework depends primarily upon two basic requirements. First, upon the application of sound mechanical principles. And, second, upon the development of a higher order of both operative and mechanical skill. If these basic requirements in the composite may not be evidenced at all times, then removable bridgework should not be attempted, because the operative part of the procedure is equally, or even more, exacting and cannot be consigned to expert dental laboratory technicians.

In many cases well designed and well constructed clasp fixtures would answer the same purpose, be more simple, more useful, and more economical, and do less injury to the supporting natural teeth.

Discussion

Albert E. Converse, Springfield, Illinois: Dr. Goslee's reference to the antiquity of dental prosthesis is borne out by the scriptural words, "a tooth for a tooth." It is not clearly indicated that the Biblical quotation had reference to some ancient form of bridgework, but if it did one cannot help regretting that back in those remote days the ancients did not settle for all time whether the most desirable form of bridge is one that stays "put," or one that can be deftly plucked out with thumb and finger and held up to the admiring gaze of friends and relatives.

There have been times in our country's history when the minds of the people have been torn and harassed by some question of public policy. Then it is that the mass of the general public looks to the leaders for counsel and guidance. Even so in our profession, there arise questions concerning which the mass of the profession looks up to the leaders for counsel and guidance. At the present time, there is a serious question in the minds of many conscientious practitioners of dentistry as to what is the correct attitude toward bridgework. As I see it, the problem is not: "Shall we construct fixed or removable bridges?" but rather I would say the question is this: "Is the fixation of teeth to the extent involved in the use of fixed bridges ever justified?" In other words: "Is the principle of fixation as applied to bridgework wrong per se; or are there conditions under which teeth may be properly united and joined by a fixed bridge?" Dr. Goslee has met the issue fairly and squarely, without any attempt at equivocation when he says: "Clinical evidence extending over a period of many years indicates, beyond a reasonable doubt, that the degree of immobilization which follows the application of well designed, and well built, and properly adapted fixed bridgework does not condemn teeth, necessarily, nor condemn the vitality of their pulps, nor invite pathology."

Doubtless there will be those who will not experience conviction nor satisfaction as a result of his matured and deliberate judgment. As for myself, I shall cling to the above quoted words through whole volumes of the vituperative utterances of the proponents of removable bridgework only, because I believe Dr. Goslee has given expression to an honest opinion based upon many years of clinical experience, and because his words appeal to my common sense.

As I see it, the question of sanitation as applied to bridgework is a secondary consideration. I say this not because I consider that sanitary requirements are of secondary importance, but because I believe that the art and science of constructing bridgework has been developed to a point where it is possible to construct fixed bridges that will satisfy all reasonable requirements in this direction. And considered purely from a sanitary standpoint I fail to see where the removable bridge satisfies ideal requirements. It is true that it is possible to remove it and thoroughly cleanse it, but it is also true that in the mouth of the average patient a removable bridge will stay in place for several hours at a time in a condition far from sanitary.

At no time in the history of civilization has it been possible to replace lost dental organs in a manner even comparable to present day methods. If, at times, it appears that we are falling farther and farther short of our ideals, it is because our ideals have been advanced and our standards raised rather than because our ability to accomplish has deteriorated. In this day and age it is scarcely necessary to emphasize the necessity of conserving tooth structure and pulps, in every possible way, in the construction of bridgework. The dental profession has been educated to a point where all this is almost taken for granted. The various forms of attachments for vital teeth as advocated by Goslee, MacBoyle, Tinker, Pyper, Knapp and many others are familiar to every member of our profession who makes any serious attempt to keep abreast of the times. Many of the evils incident to bridgework as formerly practiced have been permanently eradicated never again to be chalked up against the records of conscientious practitioners of dentistry. It may

be that the day will come when the fixation of teeth by permanent bridges will be a thing tabooed and not to be practiced. At present I prefer to agree with Dr. Goslee when he says:

"In the partial immobilization of the natural teeth the normal functioning movements are restricted necessarily, and to a degree, an abnormal condition is established. But whether the limited restriction of movement, or the establishment of a condition which is not physiologically ideal, will invite pathology, or produce a pathologic condition, is doubtful, and is not proven by clinical evidence so far."

W. D. N. Moore, Chicago, Illinois: Progress is essential to the growth of any work, but the adoption of too radical changes, indiscriminately and to the exclusion of tried and proven methods is "to reap the whirlwind" and it must be conceded that much confusion has recently prevailed on the subject relative to supplying missing teeth. I am attracted by Dr. Goslee's appreciation and remarks of the results arising from the initial break in the dental arch, which once interrupted never can be perfectly repaired.

I know of no subject in dental practice more worthy of our most serious thought than this one. The loss of a single tooth in the completed dental arch involves so much that it would justify an essay in itself. But the inevitable does happen—teeth are and will be lost and reparative dentistry is imperative. To supply these missing teeth partial plates were used at first. A gradual change followed until fixed appliances known as dental bridges were used. The mental impression of "teeth without plates" met with much enthusiasm and ill results followed. Criticism had its effect and with more knowledge and better skill results were different.

The fundamental consideration in the replacement of missing teeth—conservation and maintenance of health of the remaining teeth and their supporting tissues—is the command given us by the essayist that must be obeyed if success is to be attained. A full realization of this order can surely be appreciated today by any conscientious operator.

The claim that fixed bridgework has interfered with the natural root movement of the supporting teeth and subsequently endangered the health of the tissues surrounding these teeth, has in late years been strongly made. While it is true there must be some limitation in this tooth movement arising from fixed bridgework, the same is not alone confined to bridges of this type. We will find limitation and interference in many instances due to faulty occlusion in restorations we may have made and even in the peculiar manner in which natural teeth may sometimes be abraded. I agree with Dr. Goslee in his contention that complete fixation is impossible on account of the yielding nature of the tissues surrounding natural teeth. Admitting that teeth should be allowed their natural movement it does not follow that in the judicious use of fixed bridgework any interference or limitation is necessarily disastrous, since clinical observation has proven to the contrary.

This knowledge can be used most wisely in the practice of fixed work, but I fear it has been too frequently used solely to discourage its use entirely, which is altogether wrong. It has warned us against fixing teeth that move in different directions as well as recommending in many cases fixation for the insurance of stability and efficiency. I am fully satisfied that the greatest injury done by this method of supplying missing teeth has been due to

(1) Lack of judgment in the use and extent of fixed bridges.

(2) Improper construction and faulty technic, affording uncleanliness.

(3) Poorly fitted structures, maintaining gingival irritation.

(4) Improper occlusion.

Dr. Goslee has plainly and clearly outlined to us the advantages and indications for removable bridges. This type of work, as he has stated, has a distinct place of usefulness in supplying missing teeth. To accomplish most in this work these two types of bridges can best serve one another. It might be said removable bridgework begins where the fixed bridge ends. So many types of attachments are used in removable work that much time could be exhausted in discussing them. Suffice to say, however, those types requiring mutilation of tooth tissue and affording a rigidity and stress upon the supporting teeth contradict their claim and are a deception to themselves. The comprehensive rules given by Dr. Goslee are well and wisely chosen and I commend them for careful study. These, in themselves, are a safe guide for us to follow.

Dr. Goslee (Closing): If any of you have ever had any doubt as to the practicability of fixed bridgework, dismiss it from your minds. You will be quite safe in supplying missing teeth by means of fixed bridgework, provided you do it with good judgment, and with care and skill. Fixed bridgework is an efficient means of restoring missing teeth, notwithstanding the claims which have been made to the contrary and to which I have referred.

CASTING GOLD ALLOYS, USING AN AUTOMATIC PYROMETER ELECTRIC CASTING MACHINE

By F. EWING ROACH, D.D.S., Chicago, Illinois

(Read before the Illinois State Dental Society, Decatur, Illinois, May 8-10, 1923)

THE casting process, standardization of technic and a better understanding of the engineering problems involved has made the construction of partial dentures in metal a comparatively simple procedure.

Assuming that the profession generally recognizes the superiority of the casting process over the old plan of swaging metals to form I shall refer only to the problems encountered in the manipulation of metals by the casting process.

The requirements of strength and elasticity in addition to the larger and more complicated forms of the pieces to be cast calls for a higher degree of skill and greater care in making castings for partial denture restorations than for inlays, or other smaller pieces. Therefore it is important that we exercise great care in making castings of this type.

Briefly, our main source of trouble lies in the fact that we must melt our metals in shaping them to the case in hand and this molten condition of the metal makes it very susceptible to many contaminating influences, chief among which may be mentioned oxidation, carbonization, volatilization, contamination and shrinkage.

Overheating and the employment of the wrong kind of heat contributes to and exaggerates all of these.

Oxidation, which is the most common source of damage, is caused by melting the metal in an open crucible with an oxidizing flame and without proper protection with flux.

Copper enters into the composition of most of the alloys for prosthetic purposes and forms the principal source of oxidation.

Platinum and palladium have a strong affinity for carbon and as platinum is a component part of most dental alloys they should not be exposed to a carbonizing flame such as the acetylene torch when this gas is mixed with air. (The oxyacetylene torch when properly adjusted is perfectly safe.) Platinum has also a strong affinity for silica and when melted in contact with the investment compound absorbs the silica and becomes sluggish and brittle.

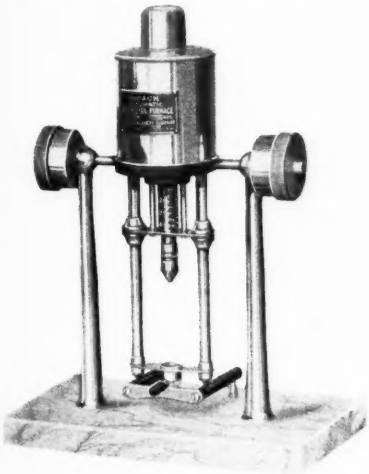
Copper, silver and zinc are easily volatilized and will be readily dissipated when subjected to temperatures much in excess of their melting points.

Incorporation of foreign metal such as aluminum, tin, lead, iron or other base metals are very common causes of porous and brittle castings. The slightest trace of any of these base metals or silica will surely produce a brittle casting.

Overheating exaggerates the damage from all of the above mentioned sources.

Shrinkage is an inherent property of metals that takes place in passing from the hot molten to the cold congealed state. This is a law in physics that we cannot change or overcome, but we can compensate for the discrepancy by sectional construction.

For many years it has been my practice to make all large restorations in sections, adhering strictly to the unit sys-



tem, or sectional construction, taking impressions in sections and casting the larger pieces in sections, after which the separate units are adjusted to place in the mouth, impression taken of them, invested and soldered.

While this plan yields splendid results it necessitates one or two additional visits upon the part of the patient and consumes additional time upon the part of the operator.

My method now is to take a good sectional impression and bite and complete the case by casting the several sections on the one cast and then unite them with solder before removing from the flask. This plan of course calls for the employment of all gold.

Cases may be made entirely of one kind of gold or two or more different alloys of gold. And by the employment of a specially designed dam between the sections gold and aluminum may be used in any case where such a combination would be desirable.

For example, in the construction of a lingual bar case where teeth are all out back of the first bicuspids on each side we proceed as follows: With cast made of Weinstein's Cast Clasp Investment, at hand, a slot is cut buccolingually across the ridge just back of the bicuspids into which the dam is cemented. Anterior to the dam the pattern for clasps and lingual bar is waxed to cast. And posterior to the dam the saddle, floors and pins for anchorage of loose pin crowns are also waxed to cast.

A two-section flask with opening on each side was designed so that a wax sprue makes connection between the pattern for clasps and bar with the opening on one side of the flask and a Y-shaped wax sprue forms the connection between saddles and the opening on the other side of flask.

The gold which forms the clasps and bar is cast in from one side; the flask is turned over and the aluminum is cast from the other side.

The dam for this purpose is made of two pieces of high fusing metals, fashioned so that it forms a positive seal between the sections and with projecting lugs on each side to serve as a mechanical anchorage between the gold and aluminum.

Several different designs of flasks are made to meet the requirements of the various types of cases. The question of galvanic action taking place between the aluminum and gold may be raised, but so far I have seen no such effects, nor do I anticipate any such trouble, and surely the aluminum is a more desirable combination with gold than rubber.

I do not favor combining gold and rubber in partial cases. In my judgment it is bad engineering. If the cost of production is a factor in making the choice, I do not agree that attaching the teeth with the rubber is a means of economy in the majority of cases.

The ideal conditions for making these prosthetic castings would be to melt them in a reducing atmosphere by radiated heat generated electrically with pyrometer heat control—cast with centrifugal force—automatically.

The machine I am showing you complies with all of these conditions except that of the reducing atmosphere. And while the reducing atmosphere is ideal, it is not essential with my device where the metal is melted by electricity in a closed chemically pure fire-clay crucible, under definite heat control.

The test of time in a number of practical cases is the only positive proof of the value of the combination of gold and aluminum in the construction of partial dentures, but with sectional construction, the employment of all gold and porcelain, following a definite standardized technic, we are approaching the ideal in partial denture prosthesis.

Discussion

H. S. Layman, Springfield, Illinois: One of the stumbling blocks to successful casting has been the difficulty to exactly determine the temperature at which the gold should be cast. By the use of Dr. Roach's casting machine he is able to cast with predetermined temperature and if the machine could do nothing else other than solving this perplexing problem it would justify its existence. The machine also permits of the boiling out of the wax by the technic developed by Dr. Knapp of Kansas City, which is to me the ideal manner of getting rid of the wax. To those still clinging to the carbonization method it also permits of its use.

To be able to cast gold and aluminum in the same mold is indeed a triumph. It sounds almost uncanny but as Dr. Roach says he has done it, we know it to be true. By this process Dr. Roach has entirely eliminated the use of rubber in the making of plates and dentures which is revolutionary to say the least.

Harold H. Hayes, Chicago, Illinois: In being called upon to discuss this machine and its technic, and being somewhat familiar with its operation, I have only to say that the process is revolutionary and in the field of partial denture restorations it is on a par with the cast gold inlay. At this time we can hardly appreciate what it means to us in its entirety, but with this machine and the methods and technic evolved by Dr. Roach, the sectional construction of partial metal plates has been standardized and greatly simplified. It eliminates the great bulk we have in rubber, and combinations of metal and rubber cases. Being able to use two different metals in the same casting makes it ideal in the many combinations possible. The machine itself is almost uncanny. With it a failure is practically impossible so that every operator may be assured of perfect results.

Dr. Roach has told you that it reduces shrinkage to a minimum, which is one of the greatest obstacles we have to contend with in making any casting. I want to emphasize this point, that there is great care needed in taking exact impressions. A perfect model is an absolute necessity. I think the next decade will show that this machine and the technic outlined by Dr. Roach will produce perfect and lasting results.

James C. Donelan, Springfield, Illinois: I would like to ask Dr. Roach in his closing remarks to tell us if it makes any difference what wax he uses as to the amount of carbon that is left on the dam; whether it means if you use wax and it is eliminated, a heavy deposit of carbon is left on the dam, and whether the aluminum or gold will attach itself mechanically or physically.

J. E. Hinkins, Chicago, Illinois: I fully appreciate what Dr. Roach has done, and I congratulate him. The results he gets in these cases are a revelation to me from a chemical standpoint. In the last few years we have been soldering aluminum successfully, and whether this union Dr. Roach gets is mechanical, physical or chemical is a question to be solved by observation and experience.

He spoke of and paid considerable attention to the power of reduction, of carbonization, and

air currents. We have all three of these in the mouth. We have the reduction and carbonization and the currents of the atmosphere. What the action of the mouth's secretions on the baser metals, and royal metals will be by this union, in this dammed-up process in sections, will be demonstrated later.

A professor in the University of Wisconsin at Madison, whose name I do not recall, demonstrated about ten years ago that it was possible with most of the organic acids to so deal with carbon dioxid gas passed with them as to dissolve all metals except platinum.

P. A. Pyper, Pontiac, Illinois: There are so many different casting golds on the market today, each trying to solve some particular phase of cast gold work, that it has resulted in many combinations. Dr. Roach has called attention to a point which I wish to emphasize, namely, look out for the copper alloys; and the other thing I have been very anxious to know and to see is the operation of this machine. Dr. Roach has solved the problem in the melting of gold which has been a thing we have been striving to attain for a long time.

The other thing I wish he would go on and do is to tell us how to get rid of the wax, without the destruction of our investing compound. I think if we give him a little time he will solve that for us too.

Porcelain has a wonderful place in our practice. It has been abandoned too soon. It is coming back and more of the profession should use it, and if you have a machine like that of Dr. Roach, you can use either gold or porcelain, whichever is indicated in that particular case. I have made this specific inquiry in my travels, and you would be surprised to see how few are using porcelain. That is one thing I feel especially interested in about this machine. I have a great big cumbersome porcelain furnace and casting machine, which I have been using. I think I will junk them both and then get this combination, with the two in one. What I was also pleased to see is the fact that Dr. Roach has solved the problem of handling aluminum, which is a wonderful metal, but we have had our ifs and ands about it. If Dr. Roach has the right combination, he has given us a wonderful asset to our profession.

Dr. Roach (Closing): In answer to the question asked by Dr. Donelan with reference to the carbon deposit on the dam interfering with the union of the metals, will say that I do not want a physical union between the gold and the aluminum. A fused or physical union between aluminum and gold invariably results in a very brittle joint due to the alloying of the aluminum with the gold.

Dr. Hinkins raises the question of chemical action with these two metals, gold and aluminum in the mouth. Possibly we may have this in some cases, but so far I have had no trouble of this sort. We know that in the earlier uses of aluminum in full dentures we had trouble with disintegration in some mouths, but for many years now we have had no such trouble, due no doubt to the better quality of aluminum.

I have the dogged ambition to put rubber in combination with gold out of the partial denture field. I cannot reconcile in my own mind the use of gold saddles, lingual bars and clasps and attach the teeth with vulcanite.

THE PRESERVATION OF DENTAL LITERATURE IN LIBRARIES

A FUNCTION OF THE AMERICAN DENTAL LIBRARY AND MUSEUM ASSOCIATION, APPENDED TO WHICH IS A BIBLIOGRAPHY OF DENTAL BIBLIOGRAPHIES AND HISTORIES

By B. W. WEINBERGER, D.D.S., New York City

(Read before the American Dental Library and Museum Association)

"Give us men of light and learning."—Lord Beaconsfield.

EVERY science has its literature. For dentistry to be progressive it is necessary to be continually stepping forward from one position to another, at the same time keeping pace with the everchanging record of the discoveries and educational methods that are constantly revolutionizing it. Accurate records are as important as careful observations.

Today dental literature has become a specialty and should be so treated in all library work. It requires the attention of one who is acquainted with it, and when it receives this attention it then attains its greatest usefulness, otherwise it lies dormant, to accumulate the dust of neglect.

Few dentists are in a position to purchase many books or journals, or rather have the inclination to do so; no one has a complete library; not even a specialist is able to gather together all the books and journals of his branch of study or practice, and if such should be the case, his shelf room would soon fail him.

There is a long list of dental journals in this and other countries, and it would be folly for one individual to attempt to collect and preserve this useful material. With the ever-increasing mass of periodical literature, the capacity of a private library would soon be overburdened, for only large *public* libraries can now equal the demands for its care and preservation.

The recognized value of this material, the increased number of readers and the difficulty of acquiring it, have thus demanded the formation of public dental libraries.

A. Jacobi once wrote "A public library of 100,000 volumes makes every medical man of the neighborhood practically the owner of 100,000 volumes. By giving away you enrich a hundred or a thousand men without impoverishing yourself. No matter, however, where the library came from, by using it, you and the other men become intellectual and professional twin brothers. Twenty men working in silence in a library grow in respect for each other, in ethical feeling, in professional brotherhood.

Even the smallest library in a county seat has a similar effect. Indeed, a book is a society, even in a poor doctor's office; often the society of a peer, frequently of a superior man. A dozen good books is a companionship of twelve. Those who live alone and practice alone in the country know that better than we appreciate it. They meet

their colleagues rarely, their country societies meet once in two, or three or six months or not at all. But in a book they may carry a friend on the saddlebag, in the buggy; and in the smallest library of a country society they have as many friends as they can take home with them and give hospitality to."

The dental library furnishes the most complete if not the only possible record of the experience of the dental profession and must be the future potent factor in dental science, culture and education.

"A large medical library, besides being the proof of existing culture and of accumulated intellectual labor, fulfills its destiny by giving information. Here the medical man with scanty means will find his textbooks and monographs to aid him in unraveling the difficulties of a case on hand. He who has an ample library of his own, will consult rare books, old journals, expensive works. Here a vast number of journals may be consulted from day to day; here those who are engaged in literary pursuits find their historical records. Moreover, and that is a point upon which I cannot insist too much, a library causes the inculcation in a great many of the habit of study and research. Here, as always, opportunity creates demand. In that result the public is as much interested as is the profession. The safety of the public requires cultured and erudite physicians. Both the ethical and the intellectual standard of both parties will stand or grow or fall together."—A. Jacobi.

The dental library is a school, a very important school, where one may commune with all the old dental and medical writers for the asking.

The dental library should be the repository of all the papers and books, and other items relating to the dental history of the community which it serves. The best time to collect such items is while they are new and before they have become objects of great rarity. The collection should include all the publications by dental men in the community whether on dental topics or not.

The library is not only a place where are gathered the best work of the masters of the times that are gone but it holds equally well the best thought of the present age. In the new books, and particularly in the monographs and journals, one finds an everchanging store of information. What the best men are doing the world over for all the different diseases and conditions. "Woe unto the man who fails in his duty of keeping up with the times! Only too often are his sins of omission descendent upon his own, as in the case related by Sir William Osler of the Physician who brought his cretin son for diagnosis. For years the misshapen, grotesque dwarf had sat directly under his father's eyes, and for years the journals and later books had featured the results obtained by the use of desiccated thyroid and had pictured the cretin with its unmistakable appearance. Both passed unnoticed, and the father answered that he was too busy practicing medicine to read books about it." The lesson is obvious. Unless one takes advantage of the best modern thought much is missed.

We can gather together this vast amount of loose material and endeavor to fill in our files until they are complete and no matter how large the library might be and the resources back of it, it will be impossible for any one institution to have an absolute perfect file of each and every dental publication so far published. This is easily proven if one should scan the want list of those libraries now in existence; nevertheless this should not deter an institution from endeavoring to constantly improve or prevent new ones from building a library.

We can, and should give the profession the opportunity to use the splendid collection of books at their disposal. We cannot drive them to drink and drink deeply of it, but those of us who have

labored in the interest of the Library and of dental libraries in general, at least have the great satisfaction of knowing that we have paved the way for the profession, and see in the future an encouraging sign of an awakening.

In the hope of emphasizing the special care that this branch of literature should receive, and advance its proper library treatment, I have gathered together for your consideration a few suggestions.

Today we have so far established five types of dental libraries arranged in accordance to my idea of value and importance to the profession.

1. Dental Libraries an integral part of a large medical library, such as the Surgeon-General's Library in Washington; the one I have the honor of being connected with, the New York Academy of Medicine; and the Denver Dental Association's Library.

2. Libraries in Universities or Colleges, such as the Northwestern Dental, Chicago, the University of Pennsylvania, Philadelphia, the University of Michigan, Ann Arbor and many others.

3. Libraries belonging to Dental Societies, such as the Eighth District Dental Society, Buffalo, New York.

4. Libraries connected with Public Libraries, i. e., Cleveland.

5. Private libraries.

As dentistry today is considered a specialized part of medicine I desire to call to your attention the advisability of having the dental section a part of the medical library. This I know will not find favor with a majority of dental librarians, and only because they are not conversant with the conditions.

The Library supported by the First District Dental Society, State of New York, is a part and parcel of the Library of the New York Academy of Medicine. The members of the above Society have access to over 120,000 medical books (not including duplicates) 77,000 pamphlets, and 12,000 reprints and are permitted to borrow all duplicates, and all but the last editions of such medical works as they desire, except purely reference works. The above material is carefully indexed and cross indexed. Over 34,000 cards have been used for the card catalogue. Only those who have made use of this index can realize what this means.

A. L. Northrup provided wisely, when upon careful consideration and due deliberation he presented his wonderful dental library to the Academy and not the local societies. He thus assured himself that it would be permanently located, and not in some years to come be broken up, sold or destroyed, and at the same time, that in the future it would be properly supervised and looked after. Only in large permanent institution, with ample help can this be done, and the full benefit to the profession and members thereof be derived.

The question of the value and the need of a dental library to any community and especially to the local societies, I hardly believe needs to be discussed here. In large cities where the profession is well organized the problem is at present a fairly simple one and is being well worked out in such cities as New York, Chicago, Philadelphia, Boston, San Francisco and Denver.

In smaller cities the problem is more difficult and yet if given time and the proper support, there is no reason why each local or state society cannot have a fairly good working library.

Dental Libraries usually grow from some private collection donated *en bloc* to start with, or by slow accretion, the nucleus being some small group of books belonging to a dental society, study club or a number of individuals.

The dental section of the New York Academy of Medicine had its origin through the gift of A. L. Northrup's library; Washington University, St. Louis, the McKellop's library and part of Herman Prinz's, the Eighth District,

Buffalo, New York, the Whitney and T. G. Lewis Libraries and the Thos. W. Evans Institute, University of Pennsylvania, the E. C. Kirk and part of Herman Prinz's libraries; University of Pittsburg, the Alfred Lee Library.

Establishing a library: There must first of all be some organization to start the work of securing and housing the dental library. Even without a permanent abiding place, a beginning should be made at collecting a library and the accumulation of books and journals will make necessary a place for keeping these. Every well-organized dental society should have its own place of meeting, even though rented quarters and the library can then be best managed by them. This also applies to the colleges.

Material can be obtained from the duplicate copies of the larger libraries. The collecting of dental journals is a slow process unless one has the means to buy series after series of periodicals collected and bound. Each Institution obtains a surplus of local material, and it is by this slow and patient process, here a few and there a few that the library begins to grow. Such a method in the course of time brings together many duplicate copies, as has been all of our experiences. It is evident that the duplicates accumulated by a library in New York would be very different from those in Chicago or San Francisco. As each collection gets a surplus of local material, the process of exchanging with other libraries in other cities comes about naturally as the easiest way to complete the files. To facilitate this work this Society should undertake to save great waste of periodical literature and utilize it by manner of an established exchange.

There are two lines along which it will be necessary for this Association to proceed in order to improve the efficiency of collections in dental periodicals, namely:

(1) The introduction of systematic, comprehensive gathering and exchanges; and

(2) A general bettering of the methods of collecting.

Systematic gathering and exchanges are functions of the men in charge of dental libraries, and can be brought to a proper degree of efficiency by an association and collaboration of these. The association we now have, the collaboration we need.

A general bettering of the methods of collecting requires, in the first place, a good, handy, and general available manual of advice and instruction to those collectors who cannot be reached and taught personally.

A method that has been successful and has brought results well worth is the use of a postal and return postal such as is here shown.

FIRST DISTRICT DENTAL SOCIETY
State of New York

CLEAN UP

Do not throw Dental Journals or Reprints away at any time, they are of value to our Library. Please bear this in mind.

Before taking your vacation, clear your office of all unnecessary dental journals, reprints and books.

We desire all *Periodicals,* (odd numbers as well as complete volumes), *Dental Books,* no matter how old, *Pamphlets, Reprints* and any *Instrument* of scientific interest, such as old appliances, engines, drill, etc. We *earnestly request same.*

Undoubtedly you have some material which we are especially desirous of securing, and although they may be duplicates, these will assist us in exchanging with other libraries and to fill in those volumes that we do not have complete in our possession.

Back copies of the early numbers of the Dental Outlook and Scrap Book. Also the Progressive Dentist, Acorn, Odontologist, Penn Dental Journal, Stomatologist, Spectator, Ash's Monthly,

etc., and Transactions of New York State Dental Society are desired.

By notifying the Librarian, he will be glad to have same called for and will acknowledge receipt.

Fraternally yours,
B. W. WEINBERGER,
Librarian and Curator,
40 East 41st St., N. Y. City.

I have)
I will have } journals for the Dental Library.
I do not have)

I have instruments for the Museum.

Please have an expressman call for my contributions.

Kindly phone in regard to Journals, etc.

Phone number .....

Date to be called for .....

Name .....

Address .....

FIRST STEPS UPON ESTABLISHING A LIBRARY

Accessioning, carding and classifying.

The first step as soon as a book is received at the library, is to properly stamp and number same upon the title-page. It is then entered into a standard accession book, as shown in the following illustrations. Accession number, class, books, volumes, author, title, place and publisher, date, pages, source (if a gift the name of the contributor, or if purchased the fund under which is was procured), cost and remarks (Fig. 1).

A ticket is then pasted on the inside cover, usually a special book plate for each fund with the proper location, (section) of book in the Library. Two cards are then typed, as follows:

1. *An author card,* giving author's full name, title-page in full, pagination, size, place of publication, publisher and date. On the back of this card is written in pencil the various cross-indices as to subject. If it is a pamphlet, the number. All pamphlets are filed in boxes according to the author's name, alphabetically. The author's card is thus the final authority as to the location. These cards as well as subject cards are arranged in strict alphabetical order.

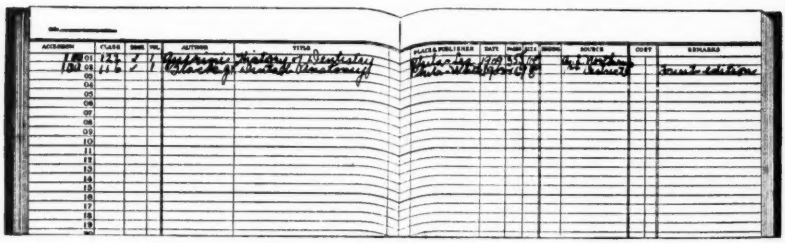


Fig. 1

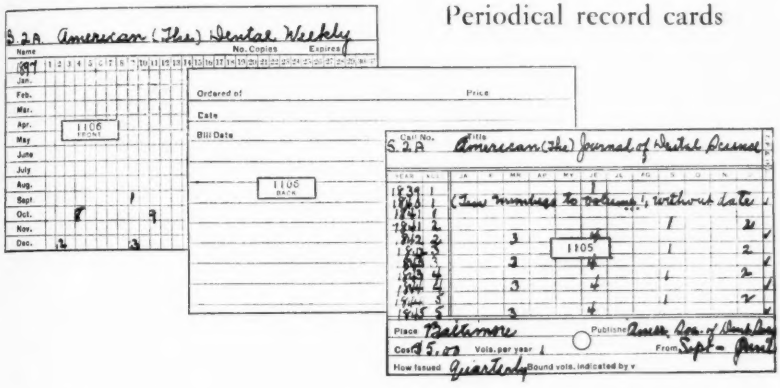
This card is sent to both active and associate members, and upon receipt of the material another card acknowledging the gift is sent, expressing the thanks of the Society for same. Last year over 125 out of a total of 900 members returned the card and we thus received 315 books and 8573 journals.

To keep up the interest in the library upon each month's bulletin, a notice is inserted asking for donations and at the same time the recent additions to the library is published.

2. *Subject card,* giving author's name with initials, title, size, place and date of publication, and location in upper left-hand corner. Over the top of

each card is placed a subject classification, i. e. "Dentistry (Periodical, Operative, etc.)."

3. *Periodical card.* With periodicals the procedure is somewhat different and is shown in the following illustration (Fig. 2). The cards used are those



of the Library Bureau No. 1105 for monthly and No. 1106 for daily or weekly. When an issue of a periodical is received a check is properly placed upon a card of the specific journal. By referring to same at any time one can immediately tell if the number has been received, and what numbers are missing. These cards are used for maintaining a convenient and accurate record of the receipt, name, publisher, price and other particulars regarding each periodical received by the library.

4. *Order cards,* for recording necessary data regarding books ordered for library use, also used as a blank on which the members may recommend new books to the library.

5. *Binding books.* Some means should be adopted for recording all books sent to the bindery, thus having a constant record of books and periodicals that are out for the above purpose.

Accessioning and shelf-listing are the means used to keep track of the books in the library, while cataloguing and classifying serve to make the material available to the public. It is usually consulted for the source and cost of items and for identification of multiple copies of the same work. The accession record can be used in a modified form, lots being entered as a whole and given a collective number instead of individual accession numbers for each work, thus serving all the purposes of the library and being economical of time and labor. A means of identification is afforded and the source is given. The cost is transferred to the order book under the collective number and duplication of records are minimized. The present cost is also generally entered in the book by the order department. This may seem a small matter but if you give these small matters your attention and consolidate and simplify your methods, so far as is possible with good work you will soon notice a decrease in your costs.

The shelf-list is one of the essential records of any well-ordered collection and the best modern practice is to use cards for this record. A card shelf-list is elastic and easily brought to date without destruction of previous work, while in the book form the sheets have to be rewritten constantly. A card list

is economical of time, labor and material and it is indispensable in taking an inventory. As a matter of fact, it is the official stock-book of the library. It should give the history of any particular volume from the time it enters the library until its final disposition. Aside from its principal use, from it the librarian can get an idea of the contents of the collection by classes, thus determining the relative growth of subjects. It can be used by the cataloguers as a partial subject catalogue, but not a complete one, as it makes no provision for analytical or collective entries, each item being represented by a single entry.

Cataloguing: A satisfactory catalogue should clearly show all the resources of the library on any given subject as well as all the available works of any author. It will also indicate by the class number where a work may be found. Do not paste these numbers on the backs of the volumes.

Expert cataloguers differ as to minor details, and for this reason and to save the time constantly wasted in the discussion and consideration of minor points, every library should have its own set of catalogue rules to which it should adhere. You may have good cataloguing without a definite set of rules but it is an individual matter and your work is liable to become non-uniform and inconsistent. Rules carried in the head are not by any means the same as a definite set on paper.

Remember that your catalogue should aim at the greatest convenience to the greatest number. Try and put yourself in the place of the reader and see his point of view, which will help you in your work. The small as well as the large library has need for a full analytical catalogue of its resources. Each work should be searched for its hidden subjects, which very often do not appear in the title. Have a uniform series of subject headings. Make as many subjects as you like, but do not place subject cards in your catalogue until you have something on the subject.

Use sufficient references, both "cross" and "see," to make your catalogue usable. Be careful not to overload; readers dislike "see" and "see also" card. Do not cross-refer and leave your subject hanging in space. Have something to refer to when you use the cross-reference. Adopt a definite style of card in order to secure uniformity.

If possible in the large library an official catalogue of authors should be kept for the library staff. Such a catalogue is a great convenience, facilitates the work, saves times and labor.

For simplicity there is nothing better than the alphabetical (author) arrangement. Anyone can then immediately place his hand on the desired volume and not need to look for subject classification. The card index should take care of that arrangement, and this emphasizes the value of a good cross-reference subject catalogue.

Classification: Among the problems which confront the librarian called upon to organize or reorganize a library the twin problem of catalogue and classification is one of the foremost. In order that wisdom may be readily accessible to the searchers for knowledge and that the treasures of the library may not remain hidden, it should not only possess a good alphabetical catalogue, but should be well arranged in methodical order. Classification is an economy. Having before him the material belonging to allied classes and connected subjects in logical sequence his mind is constantly refreshed and kept in touch with the sources of information, his service becomes more and more efficient. And last, but not least, he is made aware of the deficiencies as well as of the resources and growth of his library in a most impressive way.

In attempting the solution of the question, "What classification is best?" for a given library the librarian may not always have before him in convenient form the data which he desires to assist him in arriving at the right conclusion. The literature of the subject has grown to vast proportions, and much of it is not readily accessible even in library centers.

Two courses are open to the librarian in determining what shall be the classification of his library: 1. He may decide to work out an individual system, especially adapted to the scope and character of the collections in his charge and their use. The procedure has been largely followed in the past, and is still preferred in many instances by the larger universities and reference libraries, libraries of other learned institutions and societies, and particularly those devoted to special sciences and research or to professional interests.

The alternative course then of adopting or adapting an existing scheme of classification will commend itself to him for its superior practical advantages. Such a classified subject index for dentistry is made in the plan of the Dewey Decimal Classification, as revised by Arthur D. Black and used throughout the new "Index of the Periodical Dental Literature," also "Manuel pour la classification decimal, etc.," Emil Huet, Bruxelles, 1920.

Arrangement of Books in the Library

The arrangement of books in the New York Academy of Medicine is a fairly complicated one and one which I shall not dwell at great length. As the dental section is a part of the medical library, Dr. Black's arrangement could not be utilized. The books are placed under sections on dentistry, jaws, teeth and mouth (in all cases placed strictly alphabetically) with the histories under the general section on histories. By referring to the card catalogue any book can be obtained within a few minutes.

The International Congresses are placed as such, while the societies in the United States are shelved together, alphabetically by title, the national societies in one class, the state societies in another, and those of local or smaller localities in another.

Transactions of other nationalities are shelved by title with the periodicals of that language.

For periodicals in general the arrangement is to divide them into classes of languages, the British in one section, the French in another, and so on, with the German, Italian, Spanish and Japanese, etc., each in a class by themselves.

We maintain a closed stock, but in the main reading room, on open shelves are portions of sets of periodicals that are constantly in demand, reference books and the important new accessions.

A characteristic feature of a dental library is the presence of a large collection of reprints, pamphlets, society and college announcements. I have endeavored to make this an important adjunct to our library. The reprint is the only means of ethical advertisement the dentist possesses and lately has been greatly abused. Few dentists send these to the library, except upon special request, but there are a few who save all that comes into their possession and forward them to us. We are therefore accumulating a valuable addition to our library.

I would like to see this Association go on record and request that all publishers of dental journals, when they print an edition of a reprint for the author, should at the same time strike off fifty more and send these to the libraries.

The cost would be but very little and would be of great help in building up the libraries.

Reprints are of value in a library for several reasons. This is best expressed by Mr. Frank Place, Jr., in the April 1921 Bulletin of the Medical Library Association.

"The first is that for purposes of circulation, a handful of reprints takes the place of a dozen ponderous tomes, a process pleasing to the man borrowing them, and to the librarian, in that the library's reference value is no whit impaired. In another way the reprint increases this reference value, through acting as an index to the bound journals. Our usage at the Academy shows this. We catalogue our reprints as we do books, so that the catalogue is an index to a considerable percentage of magazine articles.

"Our experience has shown us that a doctor's memory or bibliographic habits are no better than other people's. He is coming to us to find out when he wrote such and such an article as he has given away all his reprints. Or he reads Smith's article, but doesn't know when or where it was printed, or just what it was about. If we have the reprint our catalogue shows it to him. If not, we may have a half day's search before us.

"A fourth purpose which the reprint fulfills is in giving the complete article. Space in a magazine is sometimes so precious that the details of a case or the list of references must be omitted. These portions are restored in the reprint, an addition that correspondingly increases the value of the reprint, giving it a greater value than it had in the journal.

"Our method of taking care of pamphlets is to file them alphabetically by authors in a verticle file. A case of thirty-six boxes holds seven to nine thousand pamphlets at a cost of about a cent a pamphlet. The catalogue shows what we have."

Bibliographies, Histories

A dental library should have as many bibliographies as possible, as they are of great service as time savers when looking up a given subject. It is most advisable to have the sixteen volumes of the first series 1880-1895, and twenty-one volumes of the second series, 1896-1916, as well as the two volumes of the third series of the Index Catalogue of the Library of the Surgeon General's Office. An idea of this work and its value can be obtained from the following figures of the first two series. Under the author titles there are indexed 346,-176 titles; 171,911 volumes and 317,795 medical and dental pamphlets. The subject titles show 304,962 book titles and 1,156,699 journal articles. While on its face this catalogue is only a library catalogue it is in effect an index of medical and dental literature of the world. This catalogue is also used as a code for subject headings and authors' names.

If a full set, is not available or impossible to obtain, the ten volumes under number 93 in the bibliography should certainly be included in every dental library.

There is also the Index Medicus, first a monthly, now a bi-monthly index of current medical literature, published in Washington under the able editorship of Fielding H. Garrison. This index contains most of the current literature in medical as well as a few of the dental journals.

In 1916 the American Medical Association began to issue a quarterly Cumulative Index which supplements the Index Medicus. This takes the place of the Index of the *Journal of the American Medical Association* issued previous to the above date and brought out twice a year.

We are fortunate in having some very good dental bibliographies, the most important are Coles 1883 No. 48, Dexter

1883 No. 49, Crowley 1885 No. 52, Taft 1886 No. 53, David 1889 No. 58, Lamb 1889 No. 59, Sternfeld 1891 No. 62. The latter is the most complete of all. Ports 1903-1916 No. 66, and Greve 1918 No. 82, Black's 1921, No. 85, 88, 89 and 90.

For those who are interested in building up the libraries the following sections on bibliographies and histories will prove of the greatest value, as only a few of the dental libraries can now obtain all of the above named works.

Note: Most of the following list was prepared and presented at the Milwaukee meeting before Weber's excellent article in the 1916-20 volume of the Index of the Periodical Literature appeared. However, in order to bring this up-to-date and as perfect as possible, Dr. King kindly returned the list for corrections and additions. I am indebted to Dr. Weber for some additions as well as all the bibliographies herein listed for material in compiling these lists. The section on Journal Articles as far as historical material is concerned contains only those important articles treating the subject of the "History of Dentistry" and not individual articles. I have in my library six bound volumes of nearly 4500 pages of the latter material.

The (*) under "Bibliotheca Stomatologica" indicates strictly dental works. Under history, books and articles devoted entirely to "History" (N) indicates they are to be found in the dental section of the New York Academy of Medicine and (W) in my own private library.

Bibliotheca Stomatologica

1. 1695.—LeClerc D. and Mangetus J. J.: Bibliotheca Anatomica. Geneva, second edition, 1699. (N).

2. 1746—Bunon, Robert: Remarques sur deux traités nouveaux qui concernent les dents et éloge de leur auteur. Cologne, 20 p. (W).

3. 1776—Haller, A: Bibliotheca medicinae practical. Vol. I, (1776); Vol. II, (1777); Vol. III, (1779); Vol. IV, (1788). (N).

4. 1791—Baldinger, Hrsg Von Ernstus Godofredus—Neues Magazin vor Aerzte. Vols. I-XX, Leipzig, (1779-1798). (N). In Vol. XII are those especially treating on dentistry.

5. 1793—Ploucquet, Guilielmus Godofredus: Bibliotheca medico-practica et chirurgica, 1793-1797. Vol. II, 1794, p. 682-714. (N).

6. 1799—Ploucquet Guilielmus Godofredus: 1799-1803. Vol. I, 1799; p. 311-312. (N).

7. 1803—Ploucquet Guilielmus Godofredus: p. 248-256. (N).

8. 1813—Ploucquet Guilielmus Godofredus: 1808-1813. Two volumes p. 387-388. (N).

9. 1810—Laforgue L.: Théorie et pratique de l'art du dentiste. Two volumes Paris, 337 p., I 334 p., II 377 p. Chapter XXXVII, p. 173-358. Contain 76 works of authors treating with dentistry, arranged alphabetically with a review of each work. Pages 359-364 a list of 157 authors is cited in this work, the volume and page, whether they were "dentiste, chirurgien or medecin." The first attempt at a review and a serious compilation of dental material. (N).

10. 1814—Murat: Dictionaire des Sciences Médicales. (N). (Dictionnaire has but one N in this edition.) 1806-1818, Vol. VIII on p. 423 are found 24 references to works referred to in article "Dents."

11. 1828—Maury, J. C. F.: Traité complet de l'art du dentiste, d'aprés l'etat actuel des connaissances. Avec atlas de 40 pl. 520 pages (Paris), Gabou. (N). The original edition was issued twice, one with colored plates and the other without. Maury was among the first to make a serious attempt to compile a strictly dental bibliography, and although it contains many errors there are recorded 332 books and 249 authors. Arranged alphabetically. First German edition, I volume, Weiman, 1830, 368 pages. Second edition, Paris Rouvier, 578 p. Bibl. p. 519-542. (N. W.). Second German edition, Weiman, 1840, 392 p. Bibl. p. 367-382. Third edition, Paris, 1841, II volumes, 472 p. One atlas and 42 plates. The bibliography on p. 447-464 was compiled by Paul Grosset, but does not differ from the second. (N-W). American edition translated by J. B. Savier, Philadelphia, Lea, 324 p. Bibliography p. 267-283 with an amended list by Savier. Pages 283-285 of 38 additional works. (N-W).

12. 1829—Fitch, Samuel S.: A System of Dental Surgery, 568 p. New York (N-W). Contains in pages 561-568 a list of authors and books almost a duplicate of Maury's, but not as well arranged. For some reason he translated the titles of the works into English instead of leaving them in the original. Second edition, 1835, 551 p.

13. 1830-1844—Carabelli, George: Systematische Handbuch der Zahnheilkunde, Wien.

The literature as found in the 1844 edition, history of dentistry. Vol. I. (N).

14. 1831—Begin, J. L.: Dictionnaire de médecine et de chirurgie, Paris, 1829-36. (N). In volume six, 1831 article "Dents" p. 161-219, bibliography p. 217-219.

15. 1831—Duges, A.: Dictionnaire de medecine et de chirurgie, Article "Dentition." (N).

16. 1833—Maury, (J. C. F.) and Gresset, P.: Traité complete de l'are du dentiste, etc. Second edition. Paris, p. 519-542. (N-W).

17. 1835—Fitch, S. S.: A System of Dental Surgery. Second edition. (N). In this edition the titles are in the original language.

18. 1835—Oudet, J. E.: Dictionnaire de médecine. (N). Second series, Vol. X, article "Dents" and "Odontologia." "Odontotechnic" (meme Dict., 21, 1840) 102 p. A very good and complete list of authors, books and papers are therein recorded.

19. 1837—Linderer, C. J. and J.: Handbuch der Zahnheilkunde, enthaltend Anatomie und Physiologie, Berlin, 1837. (W). Mit 18 lith. Tafeln VIII, 502 p.

20. 1842—Linderer, J.: Handbuch der Zahnheilkunde, etc., Berlin. Second edition, (N). Two volumes, 502 and 491 p. Authors p. 492-493. Contains only 25 references at the end to the works consulted in writing his book. The same number is found in the 1837 edition. 1842-1848.

21. 1843—Desirabode, M.: Nouveaux éléments complets de la science et de l'art du dentiste, (W). Two volumes, Paris, 839 p. September 1843 most of the bibliographies state that this was published in two volumes, my copy with two parts bound in the original is in one. Contains a history and bibliography p. 787-839. The bibliography is arranged chronologically and contains the more important works, 460 being recorded up to 1844. Second edition, 1845, two volumes, 839 p: The same, Baltimore first edition. Translated from the second French edition for the American Library of Dental Science by Chapin A. Harris. Also issued in serial form in American Journal and Library of Dental Science, Vol VII and VIII. Neither the book's nor the journal's article contains the his orical or bibliographical chapter. The edition referred to in David p. 87, Sternfeld p. 48, taken from Crowley p. 123 in 1886 and dated 1847, Philadelphia, is undoubtedly the translation by Robert Arthur in the American Journal of Dental Science, second series, Vol. VII, Number 1, Jan. p. 32-60, Phila. 1857. This is also the article referred to in the Dental Register, Vol. XXXIX, 1885, p. 637. Arranged chronologically.

22. 1843—Maury, (J. C.) F.: Treatise on the dental art founded on actual experiences, translated by J. B. Savier, Phila., 324 p. (N-W). Bibliography p. 267-285, appended list of 38 works, p. 283-285.

23. 1844—Carabelli, Geo.: Systematisches Handbuch der Zahnheilkunde. Two volumes, Vol. I, 176 p. Vol. II, 244 p. (N). Vol. I is the History of Dentistry with foot notes as to work cited. On p. 158-176 is the literature of dentistry, from Ryff 1548 chronologically to Liszai 1830, 333 references. A very good guide to dental literature but contains many errors.

24. 1844—Goddard, Paul B.: The Anatomy, Physiology and Pathology of the Human Teeth. Phila. 277 p. 4° (N-W). The bibliography on p. 180-192 is an exact copy of Maury's.

25. 1845—Desirabodé: Nouveaux éléments complets de la science et de l'art du dentiste. Second edition, Paris, 839 p.

26. 1847—Desirabode, Malagou (Ed.): Complete Elements of the Science and Art of the Dentist. (N-W). First American edition from the second French edition Baltimore, American Society of Dental Surgeons, 552 p. Translated by Chapin A. Harris, only foot notes, see 1857.

27. 1846—Rogers, Wm.: Dictionnaire des sciences dentaires, suivi d'un dictionnaire de bibliographie dentaire. Paris 294 p. Second edition, 1847, 639 p. (W).

28. 1848—Lindered, Jos.: Handbuch der Zahnheilkunde, etc. Second edition Berlin. (N). Bibliography p. 454-484. From 1545-1847.

29. 1849—Engleman, Wm.: Bibliotheca Medico-Chirurgica et Anatomica. Physiologica 1750-1847. (N). Supplement 1848-1867. Contains numerous works relating to dentistry.

30. 1849—*Harris, Chapin A.: Dictionary of Dental Science, Biography, Bibliography and Medical Terminology, Philadelphia, p. 778. (N-W). Second edition 1855, third edition 1867, fourth edition 1882, fifth edition 1891, sixth edition 1898. (N). This work as the title indicates is very exhaustive, thorough and is unique in the way of dental books.

31. 1849—Ruprecht, Carl: Bibliotheca Medico-Chirurgica, etc. Leipzig 1847-1892, 46 years. (N). Issued quarterly as a catalogue of new books and has a section relating to dentistry.

32. 1851—*Arthur, Robert: Report on Dental Literature, American Journal of Dental Science, second series, Vol. II, October, 1851. p. 43-59. (N-W). A report on dental literature published in America of 35 books and 11 works as published in American Journal and Library of Dental Science. Also five jour-

nals. Arranged chronologically with a detailed review o each work.

33. 1851—Linderer, Jos.: Die Zahnheilkunde nach ihrem neusten Standpunkte. Erlangen, 484 p. Titles of books p. 439-481. (N-W). The history Part V, p. 343-438 mentions a long list of authors and their works, according to countries. Pages 438-480 contain a chronological list from Herodotus 484 B. C. to 1850 A. D. A very exhaustive work, fairly accurate, thorough and well worth having.

34. 1857—*Desirabode, M.: Historical and Chronological Sketches of the most important works in the Dental Art, etc. American Journal of Dental Science, second series, Vol. VII, No. 1, January, p. 32-60. (N-W).

35. 1865—*Catalogues of a large private library of the late Chapin A. Harris, N. Y. 44 p. (N).

36. 1867—*Büchting, Adolph: Bibliotheca Odontiatrica, 1847-1866, Nordhausen 14 p. (N).

37. 1869—Sarazen, Charles: Nouveau Dictionnaire de Medicine et de Chirurgie, 1864-1886, Vol. XI, p. 182-183. (N).

38. 1869—Faure, V. P.: Aves de l' editeur l'Encyclopédia universelle des sciences et arts dentaire au XIXe siecle. Bruxelles 21 p. 4°.

39. 1874—Pauly, A.: Bibliographic des Sciences Medicals, Paris (N). A few references are to be found of the older works.

40. 1876—*Dexter, James E.: History of Dental and Oral Science in America, Philadelphia, p. 215-229, Dental literature, standard works, p. 229-235 periodicals, (N-W). This work presenting 70 works in chronological order of the standard literature of American dentistry from Woofendale 1783 to Spooner 1836 and a list of 29 dental journals.

41. 1877—Hinrich's Hallbjahrs: Katalogue Bücher, Zeitschrift Landkarten,. (N). A book sellers catalogue of medical works published during the year, contains section on dentistry. 95 volumes from 1877 to 1921 current.

42. 1878—Lempertz: Bibliotheca Medica, Bohn. **(N).**

43. 1879—*Catalogue of the Library of the Odontological Society of Great Britain, London, 24 p. Second edition 1905. (W). This was the first effort made to publish a catalogue of a dental library. Arranged alphabetically crossed references to books and authors. From the numbers this library must have had over 500 dental and medical works, including books, periodicals, transactions, etc. Appendix issued in June, 1882, 9 p., 164 references.

44. 1879—Index Medicus 1879. Current, monthly index until 1921 and then bi-monthly. Washington. (N). A very important addition to any library.

45. 1880-1895, 1896-1918—Index catalogue of the Surgeon General's Office, Washington, first and second series, 4°. See end. (N).

46. 1882—*Coles, J. Oakley: An address on dental literature (N-W) read before the British Dental Association, August, 1882. 20 p. Published in the Journal of the British Dental Association, Vol. IV, 1883, p. 59-70, 118-127. Also British Journal of Dental Science, p. 203-213, 414-422. (N-W).

47. 1882—Magitot, E.: Dictionnaire Encyclopédique des Sciences Médicales, 1844-1889, Vol. XXVII, p. 137-140, Bibliography, p. 405-408, Article Dents, p. 1-405. (N).

48. 1883—*Coles, J. Oakley: A list of works on dentistry published 1538-1582 with a catalogue of the periodical literature relating to the profession, 1839-1882, London, 35 p. (W). This was an appendix to the above address. This work was the first of a series of dental bibliographies and was divided into 12 sections, as follows: German, Swedish, Dutch, and Danish, 16, 17, 18, 19 centuries beginning with 1536, Zene Artzney; French, Italian, Belgian, Spanish, and Swiss; English 17, 18, 19 century. America 18 and 19 century; Periodical literature, English, Colonial, German and Danish, French and Italian, Spanish, American. Papers published in the Proceedings of the International Medical Congress, London, 1881, Transactions of the Odontological Society of Great Britain, 1857-1882. An unusually interesting work. Chronological.

49. 1883—*Dexter, James E.: Index of Vol. I-XXIV, Dental Cosmos, 1859-1883, Philadelphia, 367 p. (N-W). A very complete index of the material published in the Dental Cosmos. Arranged according to authors and subject. As only a content index was published each year until 1889 this work is essential in using the first 24 volumes of the Cosmos.

50. 1884-1887—Caulk's Dental Annual-short lists (1884-1887). (N-W).

51. 1884—Hirsch, Aug.: Biographisches Lexikon der heworragenden arzte alle zeiten und Völker. Wein-Leipzig, 4 vols. (N).

52. 1885—*Crowley, C. George: Dental Bibliography, etc. 1536-1885, Philadelphia. 2047 authors. (N-W). Published interleaved and without interleaves. Arranged similarly to Coles, chronologically but in five sections and does not include the periodical literature. Numbered, section I, German devoted to Germany, Austria, Holland, Norway, Sweden, Denmark and Switzerland, p. 1-52, No. 1-752. Section II, French. France, Belgium and Switzerland, p. 53-97, No. 753-1462. Section III, Spain and Italy, p. 98-100, No. 1463-1508. Section IV, English. Great Britain and Ireland, p. 101-117, No. 1509-1738. Section V, American, p. 117-138, No. 1739-2047. Author index p. 139-180. Alphabetically, re-

ferring however only to number. A more thorough, complete and accurate index than Coles.

53. 1886—*Tait, Jonathan: Index to the Periodical Literature of Science and Art, Philadelphia, 212 p. (N-W). An important addition, as this was the first attempt made to index all the periodical literature in the English language. First part devoted to bibliographies of dental periodicals, 1839-1888, p. 1-9, list of 115 dental journals published throughout the world, chronologically arranged. Part 2 subjects, p. 15-128. Part 3 authors index, p. 130-212. The subject and authors are given alphabetically. No pages referred to in the authors' index, only referring to the subject, rather confusing.

54. 1886—David, T.: Les originis francaise de le chirurgie dentaire. Coulommiers, Paris, p. 47. (W). Bibliography of 47 works of Davids' at end of work, p. 25 and 26.

55. 1886—Thomas L.: Association générale des dentiste de France. Bibliotheque, Paris, 90 p. Catalogue of the Library of the Dental School in Paris.

56. 1887—David Th. A, Fanton: Sa Vie, Son Temps, Son Oeuvre, (W). 55 p. Bibliography, p. 52-54.

57. 1888—Brasseur, E. J. N.: Encyclopédie internationale de chirurgie. Des dents et de leurs annexes. Paris, p. 555-654. (David).

58. 1889—*David, Th.: Bibliographie francaise de l'art dentaire, Paris, 307 P. 2981 references. (W). This work introduced a new step in bibliographical work, as it is confined to those published only in one language, namely French. First part. Journal and reviews, 21 in number, p. 1-5. The first is a medical journal published in March, 1818 and February, 1819, 1857-1887 chronological. Part 2, books and treatises p. 5-284, alphabetical. Supplement p. 284-289. Table of contents arranged according to a method of classification of dentistry devised by the author. Each class containing the name of the authors alphabetically arranged. There are seventy main classes with eighty-nine additional subdivisions.

59. 1889—*Lamb, J. Melvin: A monthly bibliography of dental literature, published in the Dental Cosmos, 1889-1903. (N-W). Published in 166 monthly numbers of the Dental Cosmos from March 1889 to December 1902. This work was compiled in the Library of the Surgeon General's Office, Washington, and consisted of an average of four pages each month. First giving a list of new books and journals that were received at the Library, and then alphabetically the author's name, title of paper and periodical in which it was published, page, volume and year. Most of this material was utilized for the sections issued later in the Index Catalogue of the Surgeon General's Office. As the work was not appreciated by the profession, the Dental Cosmos discontinued issuing same after fourteen years and upon its discontinuation only two inquiries were received as to the reason for stopping same. Have had these numbers bound in a single volume of 696 pages and find same not only a presentable addition to my library but a very useful reference work.

60. 1890—Brandt, Ludwig: Lehrbuch der Zahnheilkunde Berlin 708 p. (W). This work contains excellent lists of literature pertaining to various dental subjects treated in the above works. Pages 1 and 2, 25 references, 117 and 118, 75 references, 266, 27 references 378 and 379, 56 references, 526, 18 references, 578, 4 references, 640, 11 references, 55 and 56, 47 references, 199 and 200, 51 references, 285 and 286, 54 references, 437 and 439, 123 references, 560, 5 references, 603 and 604, 71 references, 680, 47 references, a total of 567 references.

61. 1891—Catching, B. H.: Catching's Compendium of Practical Dentistry, 1891-1896. 1891 Journals, p. 237-240; books, 240-241; 1892 Journals p. 277-281; books 281-282; 1893 Journals, p. 293-297; books 297-299; 1894 Journals p. 301-305; books, 305-307; 1895 Journals p. 312-316; books 317-319.

62. 1891—*Sternfeld, Alfred and Kellner, Karl: Zahnärtzliche Bücherkunde, Bibliographisches Verzeichniss, von Buchern, etc. Karlsruhe, 211 p. 4363 references. (N-W). Issued in six numbers and arranged alphabetically by authors and then chronologically as to material. The most useful, practical and accurate bibliography we have in dentistry. Not only books are indexed but also dissertations and articles from various periodicals with the name of the journals, year and page. This bibliography should be in every library and as it is almost impossible to obtain a copy, by buying the numbers in the following Journal a copy might be secured. It was also published in seven numbers of the Oesterreichisch-ungarische Vierteljahresschrift fur Zahnheilkunde, January, April, July, October 1891; January, April and July 1892. These are somewhat smaller in size than the sections of the books, but are to be found in the back of each number of the journal and numbered consecutively.

63. 1899—*Report on Committee on History. (N-W). Transactions of National Dental Association, p. 48-54.

64. *McKellops, H.: Contents of Dr. H. J. McKellop's dental library 189-, 38 p., 120 indexed according to subject and author, (N).

65. 1900—*Jahrlicher literarische Wegweiser, Prof. Arkövy, published in Oesterreichisch-ungarische Vierteljahresschrift fur Zahnheilkunde, January, 1896-1899, October, 1899-1900. (W).

65 a. 1901—*Bensow, S. C. Forteckning öfer, Nordisk Tandlärkare-litterature instill ar 1901. Helsingfors, 46 pp. (W). Pages 3 and 4 list of journals reviewed. Pages 5 to 44 authors' index, alphabetical. Pages 45 and 46 errors.

65 b. 1900—*Bonnard, E. Bibliothéque Catalogue. L'ecole et du dispensaire dentaires de Paris. Paris, 204 pp. (W). Page I list of Librarians from 1879-1900. Page II to IX, History. X, List of donators. Pages 1-102 alphabetical list of authors with works arranged chronologically. Pages 102-125 alphabetical list of subject material with authors' names. Pages 125-195, subject catalogue according to authors. 1st, Dentistry arranged according to classification. 2nd, Medicine. 3rd, Science. 4th, Miscellaneous. 5th, Periodical list.

66. 1903—*Port, G.: Index der deutschen Zahnärztlichen literature und Zahnärztliche bibliographie, Heidelberg. An index of the German literature from 1847 to 1902, 1418 p. 1904, 1 vol. for 1903, 180 p; 1905, 1 vol. for 1904, 184 p,; 1906, 1 vol. for 1905, 202 p.; 1907, 1 vol. for 1906 and 1907, 280 p.; 1908-1912, 1 vol.; 516 p., 1913, 1 vol.; 1914, 1 vol.; 1916, 1 vol. for 1914, 153 p. Port endeavored to index the complete dental literature and is the most accurate and exhaustive work of its kind. Unfortunately most of these are out of print and almost impossible to obtain. (W). This series was reprinted in 1922 by Meusser of Berlin and can now be procured in nine volumes. (W).

66a. 1905—Catalogue of the Library of the Odontological Society of Great Britain, London, 78 pp. Arranged alphabetically, authors and subjects together. (W).

67. 1904—*Eichler, Max: Index der deutschen und wichtigsten ausländischen Zahnärztlichen Literatur. Bohnn, 177 p. (W). As the name implies this is purely an index of periodical literature of 93 dental periodicals, similar to Taft's.

68. 1908—Pfaff, Ph.: Lehrbuch der Orthodontie. Dresden 484 p. (W). The "Literature of Orthodontia" p. 460-483. Pfaff lists 563 books, articles in journals, dissertations, etc., pertaining to the subject of Orthodontia. Arranged chronologically.

69. 1909—Koch's History of Dentistry, 3 volumes. (N-W). In Vol. I, Wm. H. Trueman compiled the article, Dental Journals of the United States, p. 321-355, while Edward C. Mills, A Historical Review of Dental Literature, p. 355-387.

70. 1909—*Black, Arthur D.: Classified Index of the Proceedings of the First District Dental Society, State of New York, 23 p. (W). The only record this Society has of its proceedings and although an index of a local Society, it is for the above reason that it becomes exceedingly useful.

71. 1909—*Weber, Andreas G.: Bibliographia Dentalis. Fifth International Dental Congress, Vol. II, p. 676-682.

72. 1910—Bonnet, J. L. Andre: Historie generale de la chirurgie dentaire, Paris. (W). Bibliography p. 304-316.

72a. 1910—*Svensk Tandläkare Tidskrifts Fästband. Stockholm, 267 pp. (W).

73. 1911—*Martinez, Sänchez Jose. Indice para former un Catälogo razonado de las obras impresas en castellano que traten sobre et Arte del Dentista. Bibliografia de la Odontologia Española. Madrid, 1911, 8° VIII, 63 p. Bibliography of Spanish Odontology (Weber).

74. 1911—*Terra, Paul De: Index Stomatologicus 1912, 1913, 1914. (W). Published in Ergebnisse der gesamten Zahnheilkunde, 1911-1912. Deutsche Zahnärtzliche Zeitung 1912-1913, Archives für Zahnheilkunde 1913 and 1914.

75. 1914—*Black, Arthur D.: Classified subject index and author index of the Proceedings of the Illinois State Dental Society for fifty years. 1865-1914, 268 p. (W).

76. 1914—*Gadd, Pehr.:Findlands Odontologiska Literatur, 1900-1913, Helsingfors, 1914, 37 p. (W). First part (A) a list of periodical literature of Findland. (B and C) Titles of foreign periodicals arranged alphabetically. Index of 1900 to 1913, each year separately and alphabetically. Ending with an author index. This was published as a supplement to number XIV, 1914. Suomen Hammaslääkärisewian Toimiuksia. Finska Tandläkaresällskapets Förhandlinger, Vol. II, issued in 1920.

77. 1914—*Legrand, A.: Bibliographie Dentaire Catalogue de Livre d' occasion. Paris 16 p. 549 references of french works, arranged by author alphabetically. (W).

78. 1914—*Weber, Andres G.: Bibliographia et Biblioicomographia Stomatologicae 1509-1914. Report in Transactions of Sixth International Dental Congress. London. (W)

79. 1916—Weinberger, Bernhard W.: Dental Bibliography in the Library of Academy of Medicine, N. Y. C. 40 p. (W). 729 books and 216 journals.

80. 1916—*Anthony, L. P.: Dental Publications in the World, Philadelphia. Received at the Dental Cosmos Office. The list records 108 periodicals published throughout the world, also another in 1918 showing only 85 journals were being exchanged.

81. 1916—Weinberger, Bernhard W.: A New Index of all Orthodontic Literature. (Private). 8400 references, authors and subjects.

82. 1918—*Greve, H. Chr.: Die Zahnärztlichen Literature vom ihren Beginn bis

zum Jahre 1845. Weisbaden. (W). Published in Ergebnisse der gesamten Zahnheilkunde. Vol. VI, p. 17-69. Arranged chronologically from 3700 B C. Papyris Ebers to 1845 S. Wolffsohn. One of the best lists compiled since Sternfeld's, more accurate with an added advantage that before each author's name there is a classification designating the subject as either therapeutics, pathology, chirurgy, hygiene, history, etc., thus answering a twofold purpose. Have had this bound and find it makes a most desirable bibliography.

83. 1918—*Lind, G. F. Duyvensz, en G. H. Bisseling: Lijst van werken over Tandheelkunde in Mederlandsche Bibliotheken. Gravenhagee, 48 p. (W). A catalogue of the dental material found in eight of the University Libraries in Holland. First part is an author index with a letter after each subject showing in just what library the work can be found. 493 works are listed. Second part, list of journals, 493-521. Then a table of each library with the number showing the works to be found in each. At the end a subject classification with the same method pursued.

84. 1919—*Bebb, William: Bibliography of Dental Journals published in the United States and Canada, published in the Journal of the National Dental Association, March 1919, also reprinted, 10 p. (W). A very comprehensive and accurate piece of work, although not a complete list. Doubt if such a thing will ever be accomplished by a single individual. It is so near perfect and reliable however that the few journals that are missing do not detract from the list.

85. 1920—*Huet, Emile: Manuel pour la Classification Décimale des écrits et Documents relatifs a la Stomatologie etä l'odontologie. (W). 308 p. A classification arranged on a decimal system, along the lines of Blacks, but much more comprehensive and detailed. First. Preface and subject matter, 220 p. Index alphabetical, p. 221-303, Table of material Index 304-306, Index 307-308. First published in Revue Dentaire Belge, serially, 1919-1920.

86. 1921—*Gadd, Pehr.: Findlands Odontologiska Litteratur 1914-1920. Aggelby 1921, 24 p. (W). Same arrangement as in 1914 volume.

87. 1921—*Black, Arthur D.: Classified Index of Dental Periodical Literature as published in the English language for five years. 1911-1915, 478 p. Published by the Dental Index Bureau, American Institute of Dental Teachers. An index of 65 American and English dental publications for the years 1911-1915. Arranged first according to subject based on the Dewey-Blacks Decimal System and the author index. It is not necessary to describe this or the following works. Anyone interested in dental literature will have to possess them sooner or later, for they are absolutely essential in any library, medical or dental.

88. 1921—*Weinberger, Bernhard W.: Eighteen Years of the American Society of Orthodontists, a Review with an Index of its Transactions. 40 p., N. Y.

89. 1921—*Weinberger, Bernhard W.: Orthodontic Bibliotheca, Dental Cosmos, November, 1921, p. 1126-1140. A list of works written exclusively for Orthodontia arranged alphabetically by author.

90. 1922—*Black, Arthur D.: Index of the Periodical Dental Literature for the year 1916-1920, 496 p. Third volume, 1839-75. To be issued in 1923.

91. 1922—*Black, Arthur D.: Index of the Periodical Dental Literature for the year 1921, 145 p.

92. 1922—*Weber, Andrés G.: Bibliographie Stomatological p. XIV-LIII of the Index of the Periodical Dental Literature, 1922. This is the most complete, accurate and reliable compilation of dental bibliographies heretofore published. For a description of his own bibliographies it is better to refer to the above article as justice could not be done in such a list as this.

93. Index Catalogue, Library of Surgeon General's Office. Classified according to subject. First series, Dentistry, Vol. III, p. 681-692, 1882; Jaws, Vol. VII, p. 189-230, 1886; Pyorrhea, Vol. X, p. 192-194, 1889; Mouth, Vol. IX, p. 492-503, 1888; Teeth, Vol. XIV, p. 241-267, 1893. Second series, Dentistry, Vol. IV, p. 129-152, 1899; Jaws, Vol. VIII, 428-456, 1903; Pyorrhea, Vol. XIV, p. 191-195, 1909; Mouth, Vol. XI, p. 134-159, 1906; Teeth, Vol. XVIII, p. 637-705, 1913. Total pages 259. Have been fortunate in obtaining the plate proofs of these sections and binding them into one book. (W).

94. Medical Periodicals and Transactions of Societies in the Library of the Surgeon General's Office, arranged alphabetically by countries. Vol. X, first series 1899, p. 723-936. Vol. XII, second series 1907, p. 839-978.

95. Alphabetical list of abbreviations of titles of Medical Periodicals (including dentistry) Library of Surgeon General's Office. Vol. I-XVI, 1895, 282 p. Vol. I-XXI 1916, second series, 233 p.

96. Text illustrating the History of Medicine in Library of Surgeon General's Office, arranged in chronological order. Vol. XVII, 1912, p. 89-178.

97. Besides the above there are a number of State Societies that have issued "Reports of Committee on Dental Science and Literature" and should be included in a general bibliography. Transactions of the American Dental Association. 1862, p. 69-76; 1863, p.

97-107; 1864, p. 43-54; 1866, p. 390-403; 1868, p. 113-221; 1871, p. 116-134; 1873, p. 164-176 and 177-83; 1875, p. 152-161; 1876, p. 177-193; 1877, p. 208-216; 1878, p. 185-198; 1879, p. 74-90; 1882, p. 131-139; 1883, p. 91-98; 1884, p. 143-149; 1887, p. 66-70; 1888, p. 230-236; 1889, p. 102-106; 1890, p. 50-58; 1891, p. 182-185; 1892, p. 119-121; 1893, p. 96-98; 1894, p. 54-55; 1897, p. 248-250; 1898, p. 88-90; 1899, p. 81-83.

98. Illinois State Society, Published in Dental Review: 1890, p. 856-864; 1891, p. 390-399; 1892, p. 552-556; 1893, p. 604-608; 1894, p. 421-426; 1895, p. 372-376; 1896, p. 392-395; 1897, p. 674-677; 1898, p. 441-444; 1899, p. 420-424; 1900, p. 539-543. Dental Digest: 1901, p. 551-557; 1902, p. 641-658; 1903, p. 1049-1059; 1905, p. 900-904. Dental Review: 1906, p. 682-685; 1907, p. 812-819; 1908, p. 557-572; 1909, p. 640-652; 1910, p. 655-665; 1911, p. 671-679; 1912, p. 704-725; 1913, p. 827-847; 1914, p. 876-879; 1915, p. 766-777; 1916, p. 704-721; 1917, p. 585-590; 1918, p. 679-696.

99. Pennsylvania State Dental Society, published in Dental Cosmos: 1910, p. 1376-1379; 1911, p. 1333-1337; 1912, p. 1138-1144; 1913, p. 90-95; 1919, p. 633-640; 1920, p. 742-751; 1921, p. 704-716.

Texts Illustrating Dental History

Most dental histories contain fairly accurate records of dental literature. The first section are those works pertaining entirely to dental history. Second section: Those works having introductory or chapters on dental history. Third section: Dissertations or small treatises on historical subjects relating to dentistry. Fourth section: Journal articles treating with the subject "History of Dentistry.

Section I

1. 1796—Arnemann, Justus: Ubersicht der berühmtesten und gebräuchlichsten chirurgischen Instrument älterer und neuerer zeit.. Göttingen.

2. 1906—Delabarre, C. F.: Diss sur l' historie des dents. Paris, 30 p. 4°. (W).

3. 1808—*Duval, Jacques Réné: Recherches historiques sur l' art du dentiste, chez les anciens. Paris, 24 p. (W).

4. 1821—*Audibran-Chambly (Joseph): Traité historique et pratique sur les dents artificielles incorrupibles, etc., Paris, 192 p. (W).

5. 1830—Chéreau, A.: Odontological, purely historical, p. 184-191. Vol. XIV, Dictionaire des Sciences Medicales, Paris. (N).

6. 1834—Duval, J. R.: Notice historico-medicale sur les Normands, Paris. (W).

7. 1844—*Carabelli: Systematische Handbuch der Zahnheilkunde, Vol. II, p. 1-158. (N). The first exhaustive history written on dentistry.

8. 1847—Audibran, J.: Fondation de la Société de chirurgie dentaire de Paris, etc. Paris, 154 p. (W).

9. 1848—*Linderer, Jos.: Handbuch der Zahnheilkunde, second edition. Berlin, History of Dentistry, part five, p. 402-454. (N).

10. 1851—*Linderer, Jos.: Die Zahnheilkunde nach ihren neusten Standpunkte, Erlangen, History, part five, p. 345-438. (W). An excellent history and review.

11. 1854—Hénoque, J. B. B.: Esculape et Thémis ou les dentistes au XIXe siecle, Paris, 64 p. (W).

12. 1857—*Desirabode, M.: Historical and Chronological Sketches of the Most Important Works on the Dental Art and the Special Principles serving as its Basis which have been published from the days of Hippocrates down to the present time—translated by Robert Arthur, American Journal of Dental Science, January 1857, p. 32-66. (N-W).

13. 1863—Central-Verein Deutscher Zahnärzte, Wein. (W).

14. 1867—Didsbury, Henry: Histoire anecdotique des dents, Paris, 57 p. (W).

15. 1867—Steinberger, Philipp, Uber die geschichtliche Entwicklung der Zahnheilkunde. Wien, 24 pp. (W).

15a. 1875—Preterre, Pierre, Apollonie l' art dentaire en Italie. Paris, 30 pp. (W).

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Aus dem Institut für Geschichte der Medizin an der Universität Leipzig. Direktor: Geheimrat Prof. Dr. Sudhoff.

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Editorial Department

OTTO U. KING, D.D.S., F.A.C.D., *Editor*, 5 North Wabash Ave., Chicago, Illinois.

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THE ACCOMPLISHMENTS OF THE CLEVELAND MEETING

The recent Cleveland meeting will stand out in the history of dentistry as one long to be remembered. The character of the program for the general sessions; the full attendance at each section meeting; the clinics; the great health exhibit; the display of the most modern in dental equipment on the part of the many exhibitors; the complete and detailed arrangement of the local committee; the splendid attendance, et al, combine to make the 1923 meeting the largest and the best yet held by the American Dental Association.

But a meeting however large and enthusiastic at the time would not leave its impression on the fair escutcheon of dentistry unless something big and constructive was actually accomplished—some movements begun which tend to stamp our profession among the cultured and learned professions of the times. Let us review the Cleveland meeting and note the big things undertaken, which, when carried out to their fullest fruition, will stand out as beacon lights in the history of dentistry.

One of the biggest things done by the House of Delegates was the raising of the dues of the Association to $4.00, beginning with the next fiscal year. This was made possible at Cleveland by reason of a resolution lying on the table from the previous annual meeting in relation to the raising of dues. Many of the component state societies for some years past have been assessing their members one dollar each for the work of the Research Commission; and a few of the states also are now collecting one dollar per member for the Relief Fund Endowment. For those states now contributing one dollar per member for both the Research Commission and the Relief Fund Endowment, the raising of dues to $4.00 has no effect, for they are now contributing this amount. Every member of the American Dental Association

should gladly and willingly contribute to these two essential and necessary funds; but experience has taught that the only way to bring about this highly desirable end and place each state on a just and fair basis, was to specifically raise the dues for the purpose. This, as stated, was voted unanimously by the House of Delegates at the second session at the Cleveland meeting. When we recall that the raising of the dues $1.00, for those states already contributing this amount per member for research work, means only an added contribution of less than 2c a week; and when it is known what great things can be accomplished for dentistry by this small increase in dues, every member of the Association will gladly welcome the change in the Constitutional and Administrative By-Laws, making this possible. The $4.00 dues are to be expended as follows: Two dollars for general expense of the Association, and for the publication of the Journal, as has been the custom in the past; the remaining two dollars to be apportioned to Dental Research, Dental Education, a Dental Library, and Dental Relief, as follows: one-third to Research, one-third to Education, one-sixth to Library and one-sixth to Relief. On the basis of our present paid membership, over 30,000, this will give annually over $20,000 for Dental Research, $20,000 plus for Dental Education, $10,000 plus for a Dental Library, and $10,000 plus for immediate relief purposes when worthy cases are presented. The plan for relief carries with it the raising of a like amount contributed by the parent Association from each local and state society in which state the applicant resides. It will be seen therefore that the plan for relief adopted at the Cleveland meeting makes it possible to raise a fund of over $30,000 for the year 1924, if worthy cases are presented. It also serves as a check on any particular state or community calling on the Relief Fund Endowment of the American Dental Association for more than that to which they are justly entitled.

Let us examine the need for the proper and wise expenditure of the amount of money thus raised by the small increase in dues.

First—Dental Research. It matters not how much has actually been accomplished to date by our researches receiving grants from the Research Commission, the fact that the spirit of research is evident on every hand is worth all the effort put forth along this line and in the days to come some great definite thing will surely result. Concentration of effort and thought along any line will ultimately solve great problems, and no one will deny that there are many such confronting dentistry today.

Second—Dental Education. Viewed strictly from the standpoint

of dentistry, this problem is the biggest one before us today. The time has come when dental education should be directed and controlled by organized dentistry. This means the American Dental Association working in conjunction with such bodies as the American Association of Dental Schools, and the National Association of Dental Examiners—the membership of both latter organizations are wholly composed of members of the American Dental Association. The fund now raised annually for the control of dental education will permit the continued functioning of the Dental Educational Council, which has done so much, and the stationing of an all-time Director of Education in the office of the Association where all records may be kept and more conveniently available for all those interested.

Third—Dental Library. The $10,000 annually for a Library will permit of an all-time librarian—the building of a library second to none, the indexing of all dental literature, national and international, and the codification of the dental laws of all states, provinces and nations. What will this mean for our researches and for dentistry in general? Its value cannot be estimated.

Fourth—Dental Relief. Last, but by no means least, comes dental relief. For years an effort has been made to raise a fund sufficient so that the interest could be used for relief purposes. The combined efforts of the past have raised a fund of some $98,000. This safely invested would bring in less than $5,000 annually for actual relief. Compare this to the possible $30,000 made available for immediate relief by the plan adopted at Cleveland.

There was a great story told at Cleveland. It is to be regretted that the entire membership of the Association was not present to hear and learn the story. Part of it has been repeated for the benefit of those not present. Ask your delegates for other things accomplished, and pay your dues to the American Dental Association with the feeling that it is the least one can do for a great cause.

JOHN P. BUCKLEY.

RELIEF FOR RUSSIAN DENTISTS

At the 1922 meeting of the International Dental Federation in Madrid, Spain, a communication was received by the President of the Federation, Truman W. Brophy, from one of the Russian members, Dr. Daubry, outlining the pitiable plight of many of our colleagues in that country. When the soviet government assumed control, it, in accordance with its avowed principles, confiscated all private property,

including the instruments and appliances of dentists. What became of these instruments no one seems to know, but the net result was that the members of our profession were left without the means of earning a livelihood for themselves or their families.

All the world is familiar with the wonderful rescue work of the Hoover Commission, whereby literally millions of the people of Russia have been saved from starvation. In a recent interview which Dr. Floristan Aguilar, Secretary-General of the International Dental Federation, had with Mr. Hoover in Washington, the latter said: "We have done a great deal of good in Russia, feeding the children, healing the sick, and caring for starving women. At certain periods with money collected in America, we have been feeding 10,000,000 people, but it is true we have neglected to help the professional men. The work that you dentists are going to undertake is admirable, and if other professions would do the same, the fate of the intellectuals in Russia who today are the greatest sufferers would be different."

These are inspiring words from a distinguished man who knows the situation. Mr. Hoover has directed the distribution in Russia of $60,000,000, and this with an additional $18,000,000 sent over by the Jewish people, represents a grand total from America of $78,000,000.

But as Mr. Hoover has said, the professional man has been overlooked. Thus it has happened that men of the highest cultural attainments, with their wives and children have been obliged to suffer deprivation and want, and in some instances have actually died of starvation. That this sad fate has overtaken some of the members of the dental profession of Russia is vouched for on reliable authority.

When these matters were brought to the attention of the Federation, this body commissioned its Secretary-General, Dr. Aguilar, of Madrid, to go to Russia and make an investigation of the existing conditions, and report his findings. This he did, and returned from Russia to Madrid about a month before the meeting of the American Dental Association at Cleveland. Coming to America, he placed before the Board of Trustees and the House of Delegates of the Association the facts as he had ascertained them. He found our colleagues of Russia almost without exception in actual want—some of the distinguished men of former days not even having shirts to cover their backs.

More than four hundred letters have been received by the International Dental Federation from Russian dentists portraying the most pitiable conditions, and making an appeal that would rend the heart. Dr. Aguilar has shown the editor and many others these letters and

they are of a character to leave no doubt as to the deplorable state of affairs. Their appeal is unanswerable. The dentists do not ask for charity. All they desire is the opportunity of earning a livelihood.

As has been said they are without instruments, but the government last May receded sufficiently from its former position to grant permission to private citizens to own a limited amount of property. So these professional men may own instruments if they can secure them.

After studying the matter in conjunction with other men interested in the situation, Dr. Aguilar found that for fifty dollars, American money, a set of instruments sufficient to enable a dentist to pursue his calling might be procured. In all, it was estimated that fifteen hundred sets were needed, and it was hoped that the dentists of the world would see that these instruments were provided. When the American Dental Association learned these facts, it at once decided that it became the urgent duty of its members to raise its quota of this amount. There are approximately 90,000 dentists in the world, and a little more than 30,000 in the American Dental Association—which would make our pro rata five hundred sets. The House of Delegates immediately voted from its treasury $2500, thus furnishing fifty sets. The remainder was provided for as follows: One-half the income from the Relief Fund—which was greatly augmented this year by a raise of dues in accordance with a recommendation in President Buckley's address—would provide for one hundred sets ($5,000). There are approximately two hundred delegates, and these delegates pledged themselves to raise from their respective states a sum equal to two sets of instruments for each delegate—making 400 sets. It will thus be seen that our Association has provided for 550 sets—fifty more than its pro rata, for the reason that some of the countries of the world may not be able to raise their full quota on account of war conditions.

It is of interest to note how very prompt is the response to this appeal on the part of some of our societies. At the regular monthly meeting of the Chicago Dental Society held on September 18, after listening to a statement of the conditions in Russia by Dr. Aguilar, the members at once pledged thirty-two sets of instruments, which represents the allotted quota for the entire state of Illinois. When the matter is brought before the members of the down-state organization this quota will undoubtedly be greatly raised, thus appreciably making up for the discrepancies in other countries already referred to.

It would hardly be fitting to close without a special reference to the splendid self-sacrificing efforts of Dr. Aguilar in this connection

whose picture appears as a frontispiece in this issue of *The Journal.* He has whole-heartedly devoted his time, energy, and private means to the furtherance of this great philanthropy. While in Russia he became so impressed with the deplorable conditions among the members of the profession and their families, that he and Mrs. Aguilar, who accompanied him, gave away nearly everything they had, and arrived in Paris with only the clothes they were wearing, and seventeen francs in money. He has also sent out of his own private funds many sets of instruments to Russia and has the official receipt to show that they reached their destination safely.

It should be said in this connection that the Russian Government has guaranteed the safe delivery of every set of instruments, and has promised to transport them free of cost, and without duty. The Federation keeps a close check on every shipment, and the cars containing the instruments are securely sealed by the proper official, and not opened till the instruments are delivered to the dentists to whom they are consigned.

If there was ever an appeal to the dentists of the world which merited consideration, this is one. The International Dental Federation in undertaking this work is merely giving expression to one phase of its true function, and the fruition of this philanthropic movement will mean greater confraternity among the men practicing dentistry in every quarter of the globe.

WHAT I SAW IN RUSSIA AND PLANS FOR RELIEF—A MESSAGE FROM THE SECRETARY-GENERAL OF THE F. D. I.

A little over a month ago I presented to the delegates of the National Dental Association of eighteen different countries assembled at the International Dental Federation at Paris, the report of what I saw in Russia with documents, testimonies and over four hundred letters of dentists asking for held. When this report is published in detail everyone will see the great importance of the work planned by the International Federation by which dentists of all nations are coming to the rescue of a group of colleagues in distress, and helping them, not with food or clothes, a charity of momentous efficiency, but with a complete instrumentarium, a donation that rehabilitates the fallen ones, putting them again in condition, working and enjoying life and happiness. The members of the Council of the International Dental Federation pledged themselves to promote in their respective countries

the collection of the fund. The United States has been the first to answer the call and every dentist will learn with pride the rapidity with which the American Dental Association at the Cleveland meeting pledged the dental profession of America to contribute 550 outfits or $27,500 and the Chicago Dental Society three days later, accepted the entire quota of 32 sets for the state of Illinois. To them, I desire to make clear how the International Federation is going to disburse the funds. Before I left Moscow, a committee of prominent and representative dentists was formed, composed of Doctors Dauge, Furman, Redalier,

Meeting of the Executive Council of the International Dental Federation presided over by H. M. The King of Spain, and Dr. Brophy of Chicago, attended by delegates of eighteen nations, where the letters of appeal for relief from Russia were received.

Margolin and others from different regions, presided over by a representative of the Government and charged to secure the names and addresses of the dentists that were in greater distress and merited help. Doctor Schmarko, member of Lenine's cabinet as Minister of Interior, gave me a document, thanking the Federation for the help to be given to Russian citizens in the way of instruments or clothing which, in consideration of its philanthropic object, will be permitted to enter Russia free of duty and shipped to Riga, the frontier, in cars sealed under Government guaranty and transported free to Moscow, if the parcels carry the seals of the Federation. So far, this plan has proven successful as twenty-three parcels have been already sent from Berlin and the

receipts with the signature of the receiver, have been returned to me, thus proving the efficiency of the system. The Moscow committee has furnished the list of petitionaries from whom I have also received over four hundred letters, stating their afflictive condition and it is estimated that about fifteen hundred is the number of dentists that are in absolute poverty.

The "standard dental sets" which the Federation approved contain a modest, but fairly complete set of instruments which will permit to do the ordinary operations. Dental manufacturers of Europe especially C. De Trey and Co. of London, have generously offered their articles at cost price or less. The parcels assembled in Berlin are dispatched to Riga where the office of the Red Cross takes care of inspecting their departure so that there may be no loss or damage; and the committee of Russian dentists together with the employees of the Federation in Moscow will supervise the distribution of the parcels. The lists of subscribers and detailed accounts of expenses will be published in the dental Journals of all nations. *When in Washington I submitted the plan of the Federation to the Secretary of Commerce, Mr. Hoover, for counsel as an expert in relief work in Russia. He not only approved of it but offered the co-operation of the American Relief Administration and deplored that other professions had not done what dentistry was undertaking.* Remember that at the implantation of the soviet regime dentists, as everybody, were deprived of personal property, including their instruments, leaving each member of a family with only one suit of clothes. Famine and epidemics followed that chaos which cost Russia eighteen millions of souls and the charity of the world was directed to the new Republic, distributing hundreds of millions of dollars in food to the starving population. Now the law has been changed. With the new economical policy the citizen is allowed to work for himself and to own property. The American Relief Administration and similar institutions have suspended the distribution of food, either because the resources have been exhausted or because the crops in Russia have been better this year. The peasant and the workingman are in better condition, but that of the professional man including the dentist is worse than ever because he has no instruments to work with and make a living. It is those members of our dental fraternity that we are going to help and with them, their families and children. From them we will receive words of thanks and the eyes of many children who cry no more because they have cried too much, will once more smile because we have given them a chance.

FLORISTAN AGUILAR.

1. Some of the orphan children whose parents died of starvation or epidemics. 2. Some specimen of citizens who have suffered from lack of food. The swelling of the legs is produced by starvation. 3. At the door of the "Nansen Mission" where the committee of Russian Dentists (Doctors Efrong, Kovarsky, Redalier, Margolin) were permitted to meet with the delegate of the International Dental Federation and organize the work of relief. 4. Ward of a hospital in the Volga region. 5. Dead bodies of those who died of starvation and typhus.

THE JAPANESE CATASTROPHE

Just as we go to press we receive the following information from the Department of State at Washington:

"September 26, 1923.

Dr. Otto U. King, Secretary,
American Dental Association,
5 No. Wabash Ave.,
Chicago, Illinois.

Sir:

The Department of State has received through the American Embassy at Tokyo the enclosed telegram for transmission to you from Dr. L. E. Butler regarding certain relief measures for dentists in Japan. In transmitting the enclosed telegram, Ambassador Woods stated that he had informed the Dental Association in Japan of the policy of the Red Cross to deliver to the Japanese Imperial Relief Bureau only such relief articles as it may request. The Ambassador stated, however, that in his opinion the additional relief mentioned in Dr. Butler's telegram would aid a worthy cause.

I am Sir,
Your obedient servant,
WILLIAM PHILLIPS,
Acting Secretary of State."

The following is an extract of the telegram received by the Department of State from Tokyo, dated September 24, 1923:

"Five out of seven dental colleges, and six out of seven manufacturing dental dealers in entire Japan totally wiped out. One thousand dentists out of eleven hundred in devastated area have lost everything. After consultation with officers Japan Dental Association, I am authorized to ask if American Dental Association will come to our rescue in restoring our profession. Detailed letter regard requirements follows. Signed, L. E. Butler, D.D.S."

At the time of the meeting of the American Dental Association at Cleveland, no reliable information was available as to what had actually befallen our confreres in Japan, though from the published accounts of the calamity it seemed inevitable that many of them must have suffered. Accordingly the following resolutions were unanimously adopted:

"WHEREAS, the people and the members of our profession in Japan have suffered from one of the greatest catastrophes in the history of the world, therefore be it

Resolved, That the American Dental Association hereby extends the most profound sympathy to the people and to the dental profession of Japan, and be it further

Resolved, That adequate measures be adopted to give substantial relief to our confreres in Japan."

How appropriate were these resolutions is amply borne out by the foregoing communication from the Department of State, and it is safe

to affirm that if the actual facts had been known at that meeting a very substantial relief fund would have been raised at once. But it is not too late now, and when the urgency of the need is considered, we feel sure that every member of the Association will rally to the aid of these stricken Japanese brothers of ours. The office of the Secretary, 5 No. Wabash Avenue, Chicago, Illinois, will be placed at the disposal of anyone wishing to help. Funds or instruments may be sent to this office with the assurance that they will speedily be forwarded to the proper authorities in Japan, and also acknowledged in future issues of the *Journal of the American Dental Association.*

Now is the time for every open-hearted practitioner in the United States to demonstrate his philanthropy and good will by sending in money or instruments at once. Let us see how large a list of donors we may be able to publish in our next issue. The least we can do is to try to warm the hearts of those who have been so sorely stricken. We will keep our readers fully informed as the added facts of the disaster come in, and meanwhile let the profession of America show its wholeheartedness and generosity by a ready response to this appeal. When the San Francisco disaster occurred our profession rushed to the aid of the dentists in that city, and now that an infinitely greater disaster has happened to our colleagues across the Pacific, we should exhibit a similar philanthropic spirit. Send your contributions at once.

OFFICERS OF AMERICAN DENTAL ASSOCIATION

President: William A. Giffen, Detroit, Michigan.

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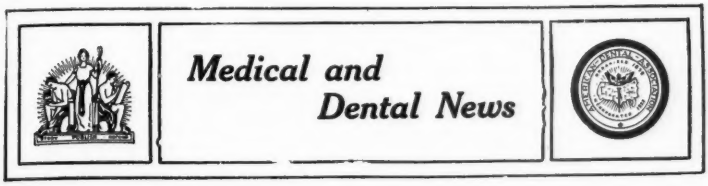


ILLINOIS

Corrective Classes for Chicago School Children: Rehabilitation of children with physical defects will be undertaken in the Chicago schools next fall on an extensive scale. Ten vision conservation classes with special lighting equipment and books in special type will be conducted for children with defective sight; children needing artificial limbs will be enabled to purchase them by small weekly payments; and plans to aid children crippled by infantile paralysis have been made. The state has appropriated $100,000 for this work and this amount has been increased by appropriations from other sources and by private gifts.—Journal American Medical Association, Chicago, July 28, 1923.

MAINE

Child Health Work in Maine: The Maine Public Health Association has appointed a committee to draft a statewide program of child-health work for volunteers. The high death rate in Maine among children, especially those of pre-school age, has become a matter of great concern to health workers throughout the state.—Journal American Medical Association, Chicago, June 30, 1923.

NEW YORK

Do Height-Weight Tables Work: Height and weight tables alone are not always successful in detecting malnutrition, according to the report of a survey of some 4,000 children of Italian parentage in a district of New York City, made by the Association for improving the condition of the poor. According to the diagnosis of the pediatrician employed by the association for the examination of these children 89.8 per cent of the cases of malnutrition among boys and 81.8 per cent of the cases among girls in the group would have been overlooked if height and weight tables and a 10 per cent limit of underweight had been used as the sole basis of classification. These findings are partly explained by the fact that the children in the area covered by the study deviate widely from the national type, tending to be shorter and stockier than the general average of children throughout the country.—Statistical Bulletin, Metropolitan Life Insurance Company, July, 1923.

FOREIGN

Traveling Hospital: A traveling hospital recently placed in operation visits remote districts which are without school medical service, clinics, consultation centers, or other welfare arrangements. Its main purpose is school medical service. Contrary to the practice generally prevailing among school physicians, the physicians connected with the traveling hospital treat the diseases of the school children and give dental care if such treatment and care are not otherwise available.—Zeitschrift fur Kinderschutz, Familien-und Berufsfursorge, Vienna, June, 1923.

Borax as a Food Preservative: A medical officer of a London suburb recently reported that some sponge-cake sold in a local bakery had been found to contain more than 35 grains of boric acid to each pound of cake. Investigation showed that the source of the boric acid was the liquid eggs (that is, egg-yolk and albumen, without the shells) shipped from China and reconstituted in England, used in the manufacture of the sponge-cake. The liquid-egg trade in England is said to amount to nearly $10,000,000 annually. Practically no liquid-egg yolk containing boric acid comes into the United States except such as is to be used for technical purposes, such as the tanning of leather. In such instances the federal authorities require the material to be so denatured that it

cannot possibly be used for food purposes or the officials demand definite proof that it will be used only for technical purposes. Liquid egg containing boric acid is refused entry into the United States on the ground that it is adulterated within the meaning of the Food and Drugs Act. The case reported from London well illustrates what happens when the bars are let down to chemical preservatives.—Journal of the American Medical Association, May 5, 1923.

GENERAL

The Harvard Study of Mental and Physical Development: In order to find out exactly how the individual child grows in mind and body, the Harvard Graduate School of Education, with the co-operation of public and private schools in the vicinity, has embarked upon an investigation of the mental and physical development of hundreds of schoolboys and schoolgirls. This investigation is expected to occupy twelve years, and is regarded as the first of its kind ever undertaken on so large a scale.

The plan of the investigation is to take several hundred children and submit them at intervals to measurements and tests over a period of twelve years, say from the age of six to the age of eighteen. This will give an accurate record of how each individual child is growing mentally and physically throughout that period. Hitherto practically all the information secured by physicians, teachers and psychologists on the mental and physical growth of children has been based on averages from the measurement of groups, and thus has thrown but little light on the relation between bodily and mental growth in the individual.

Hundreds of children are now being examined by Professor Dearborn and his staff at the psycho-educational clinic at Harvard, which has been specializing for several years in the measurement of intelligence and the testing of school accomplishment. Each child is given intelligence tests (group and individual); has his school accomplishment measured by means of standardized tests in reading and arithmetic and has his teacher's judgments and observations of the above recorded. His height, weight and bodily proportions are also measured; his physical condition is observed; his teeth are examined to see how the process of dentition is coming along; and the ossification of the carpal bones is shown by the x-ray photographs.

By repeating these measurements at intervals for twelve years, the Harvard investigators hope to secure complete records of the individual development of a representative group of children throughout their school course.—Scientific American.

"Twilight Sleep for the Teeth": The latest addition to the long list of fakers who follow in the wake of dentistry is the so-called "Twilight Sleep" outfit.

Here we find a cheap appeal being made to the public through the use of a term which was employed extensively a few years ago in various sensational magazine articles, descriptive of a "wonderful anesthetic" for childbirth.

It is too bad the gullible public is taught to think that there is anything "wonderful" in "Twilight Sleep for the Teeth." It is too bad that folks are led to believe that these "Twilight Sleep" wizards have something in the way of anesthetics which reputable dentists do not have and use. It is too bad that our Better Business Bureau will permit these men brazenly to tell the public that they can do more in half an hour than the rank and file of dentists can do in a whole day.

Some time ago the Better Business Bureau solicited the Portland District Dental Society to become a member of that organization. The society did so. Are Portland dentists getting anything out of their membership on this latest score against fake dental advertising?

At the earnest solicitation of enthusiastic "teams" of Chamber of Commerce representatives, many of us became members of the Oregon State Chamber of Commerce not so long ago. Can this body reasonably expect from us a continuation of our moral and financial support, when they throw their advertising columns wide open to such things as "Twilight Sleep?"

Reputable dentists who join the State Chamber do so from a motive of loyalty to the state. They wish to help in the building up and betterment of the state. Why then, should their own Journal of Commerce be permitted to become the means of the self-exploitation of the renegades of our profession?

Is it possible that this representative body thinks more of the few dollars realized from such advertising, than of the goodwill and hearty support of the reputable dentists who are its own members?

If they insist on printing such adver-

tising in the official journal, then decent dentists will simply withdraw from the organization.

It is for the State Chamber to choose whether they wish to play up to the outcasts of our profession, or retain the support and friendship of the dentists in good standing who make up its backbone.—Northwest Journal of Dentistry, August, 1923.

Good Pamphlets and Books of Interest to Dental Hygienists: "Health for School Children." A report of the Advisory Committee on Health Education of the National Child Health Council. This will serve as an excellent textbook for those interested in the proper methods employed in organization, procedures, health habit formation and in securing community co-operation. Price, 10 cents. Address the Department of the Interior, Bureau of Education, Washington, D. C.

"The Campaign Against Malnutrition." A pamphlet prepared by the Advisory Committee on Foods and Nutrition of the National Child Health Council. Price 10 cents. Address the Treasury Department, United States Public Health Service, Washington, D. C.

"Hygeia," an excellent monthly magazine published by the American Medical Association, 535 No. Dearborn St., Chicago, Illinois. Gives one a general knowledge of the best practices and foremost thought in health matters.

The books are as follows:

Hygiene of the School Child, Termin; The Health of the Runabout Child, Lucas; Health Education in Rural Schools, Andress; The New Public Health, Hill; What Men Live By, Cabot; How We Think, Dewey; The Newer Knowledge of Nutrition, (2nd Edition, revised), McCollum.—The Dental Hygiene News Letter, July, 1923, San Francisco, Cal.

Report of Second Annual Dental Essay Contest: The winners in the essay contest conducted by the State Board of Dental Examiners have just been selected by a committee working under an appointment by Superintendent of Public Instruction J. A. Churchill.

The subject of the essay for the fifth and sixth grades was "How Good Teeth May Aid Good Health," and for the seventh and eighth grades "Why are Good Teeth Essential to Good Health?"

In the contest the grades in the district outside of a district of the first class competed while districts of the first class were pitted against one another. A prize of ten dollars is given the winner of each county prize and twenty-five dollars to the winner of the state prize. Several thousand students wrote essays in this contest.—Northwest Journal of Dentistry, August 1923.

Speech Restored by Tooth Extraction: A somewhat unusual result of the extraction of septic teeth is described in the Dental Summary as follows:

"Three years ago Mrs. B., about forty-two years of age, came to my office for the extraction of a badly diseased upper right first bicuspid root. Mrs. B. was brought to me by another patient of mine, who asked me to perform this operation. I was rather astonished at the reticence of the patient, and, upon inquiry, was told that she lost her speech suddenly about two years previously.

After making a thorough dental examination, I found that there was no need of any x-ray diagnosis, as her mouth was in a very filthy condition, and after explaining the matter to my patient's spokesman, and with the aid of the sign language and gestures, she permitted me to extract what remaining teeth and roots she had in her upper jaw.

The operation was completed at one sitting, and I was astonished that in a very short time after the operation she was able to speak almost as well as she did five years ago.

It is now three years since her teeth were extracted, I having followed her case with interest. She can talk as well as ever now."

The history of the case suggests some hysterical element in the case, kept up, doubtless, by the effect of the oral sepsis upon the general health. The ultimate result at any rate is extremely gratifying.—The Dental Surgeon, No. 973, Vol. XX, p. 404.

A Rule of Three: Three things to govern—temper, tongue and conduct.

Three things to cultivate—courage, affection and gentleness.

Three things to commend—thrift, industry and promptness.

Three things to despise—cruelty, arrogance and ingratitude.

Three things to wish for—health, friends and contentment.

Three things to admire—dignity, gracefulness and intellectual power.

Three things to give—alms to the needy, comfort to the sad and appreciation to the worthy.

Announcements

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Association of Oral and Plastic Surgeons, October 22 and 23, 1923, Congress Hotel, Chicago, Illinois.

STATE SOCIETIES

National Capital, first Tuesday of every month.

November

Arizona, at Chandler (2, 3).
Florida, at Jacksonville (8, 9, 10).
Georgia, at Athens (7, 8, 9).

December

Ohio, at Columbus (4, 5, 6).

January (1924)

Chicago Dental Society, at Chicago (17, 18, 19).

April (1924)

Virginia, at Norfolk (28, 29, 30).

May (1924)

Pennsylvania, at Pittsburgh (13, 14, 15).
Tennessee, at Chattanooga (5, 6, 7).

MEETINGS OF STATE BOARD OF DENTAL EXAMINERS

California, at San Francisco, December 8. Secretary, C. A. Herrick, 133 Geary St., San Francisco, California.

Colorado, at Denver, first Tuesday of December. Secretary, Wm. H. Flint, Littleton, Colorado.

Connecticut, at Hartford, December 6, 7 and 8. Recorder, Arthur B. Holmes, 63 Bank Street, Waterbury, Connecticut.

Georgia, at Athens, November 7. Secretary, D. D. Atkinson, Brunswick, Georgia.

Indiana, at Indianapolis, November 5. Secretary, H. C. McKittrick, 1006 I. O. O. F. Bldg., Indianapolis, Indiana.

Kansas, at Wichita, first week in December. Secretary, George E. Burket, Kingman, Kansas.

Maryland, at Baltimore College of Dental Surgery, 851 N. Howard Street, Baltimore, November 7, 8 and 9. Secretary, T. L. McCarriar, 1822 N. Charles Street, Baltimore, Maryland.

Massachusetts, at Boston, October 10, 11, 12 and 13. Secretary, J. N. Carriere, D.D.S., 146 State House, Boston, Massachusetts.

Michigan, at Dental College, Ann Arbor, November 19 to 24. Secretary, B. S. Southerland, 401 Ward Bldg., Owosso, Michigan.

New Jersey, at Trenton, December 3 to 7. Secretary, John C. Forsyth, 429 E. State Street, Trenton, New Jersey.

NORTHERN ILLINOIS DENTAL SOCIETY MEETING

The Northern Illinois Dental Society will hold its meeting October 17 and 18, at Freeport, Illinois. For further information, address

B. H. BIGLOW, *Secretary*,
609 Stewart Bldg., Rockford, Ill.

TENNESSEE STATE DENTAL ASSOCIATION MEETING

The Tennessee State Dental Association will hold its fifty-seventh annual meeting in Chattanooga, Tennessee, May 5, 6 and 7, 1924.

C. E. BYINGTON, *President*,
James Bldg., Chattanooga, Tenn.
JOE MINOR, *Secretary-Treasurer*,
Lambuth Bldg., Nashville, Tenn.

VIRGINIA STATE DENTAL ASSOCIATION MEETING

The fifty-fifth annual meeting of the Virginia State Dental Association will be held in Norfolk, April 28, 29 and 30, 1924 with headquarters at the Monticello Hotel. For further information, address

HARRY BEAR,
410 Professional Bldg., Richmond, Va.

KANSAS STATE BOARD OF DENTAL EXAMINERS

If there are enough applicants to warrant holding examination, the Kansas State Board of Dental Examiners will meet in Wichita, Kansas the first week of December. For further information write

GEORGE E. BURKET, *Secretary,*
Kingman, Kansas.

INDIANA STATE BOARD OF DENTAL EXAMINERS

The Indiana State Board of Dental Examiners will hold their next examination in Indianapolis, beginning November 5. For further information and applications, write

H. C. MCKITTRICK, *Secretary,*
1006 I. O. O. F. Bldg., Indianapolis, Ind.

MASSACHUSETTS STATE BOARD OF DENTAL EXAMINERS

There will be an examination held by the Massachusetts Board of Dental Examiners in Boston on October 10, 11, 12 and 13. All applications for examination must be filed with the Secretary at least ten days before examination. For full particulars, application blanks, etc., address

J. N. CARRIERE, D.D.S., *Secretary,*
146 State House, Boston, Mass.

CALIFORNIA STATE BOARD OF DENTAL EXAMINERS

The next examination by the Board of Dental Examiners of California of applicants for a license to practice dentistry in that state will be held in San Francisco beginning on December 8, 1923 at 9 A. M. For further particulars, address

C. A. HERRICK, *Secretary,*
133 Geary St., San Francisco, Cal.

MARYLAND STATE BOARD

The regular semi-annual examinations of the Maryland State Board of Dental Examiners will be held at the Baltimore College of Dental Surgery, (University of Maryland) building, 851 N. Howard Street, Baltimore, Maryland, on Wednesday, Thursday and Friday, November 7, 8 and 9, 1923, starting at 9 A. M.

For further information and application blanks, address

T. L. MCCARRIAR, *Secretary,*
1822 N. Charles St.,
Baltimore, Maryland.

GEORGIA STATE BOARD

The Board of Dental Examiners of Georgia will meet in Athens, Georgia, on November 7, 1923, at nine o'clock A. M. for the purpose of examining applicants for license to practice dentistry in Georgia.

THOMAS COLE, *President,*
D. D. ATKINSON,
Secretary and Treasurer,
Brunswick, Georgia.

NEW JERSEY STATE BOARD

The State Board of Registration and Examination in Dentistry of New Jersey will hold their regular examination at Trenton, New Jersey, December 3 to 7, 1923. License fee, $25.00; re-examination fee, $10.00.

Practical tests required: Insertion of an approximal gold filling with the approximating tooth in position, compound approximal amalgam filling and a silicate filling; candidate must furnish his own patient. Taking of impressions, bite, selection of teeth, articulation, trial plate; candidate must furnish his own patient. Practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: "Applicant shall present to said board a certificate from the Commissioner of Education of this State, showing that before entering a dental college he or she had obtained an academic education consisting of a four-year course of study in an approved high school, or the equivalent thereof."

In accordance with this law the secretary will issue application blanks only upon presentation of the required certificate from the

Commissioner of Education, State House, Trenton, N. J.

Application must be filed, complete, ten days before the date of the examinations.

Address all communications for further particulars to

JOHN C. FORSYTH, *Secretary,*
429 E. State St., Trenton, N. J.

AMERICAN ASSOCIATION OF ORAL AND PLASTIC SURGEONS

The third annual meeting of the American Association of Oral and Plastic Surgeons will be held in The Rose Room, Congress Hotel, Chicago, Illinois, Monday and Tuesday, October 22 and 23.

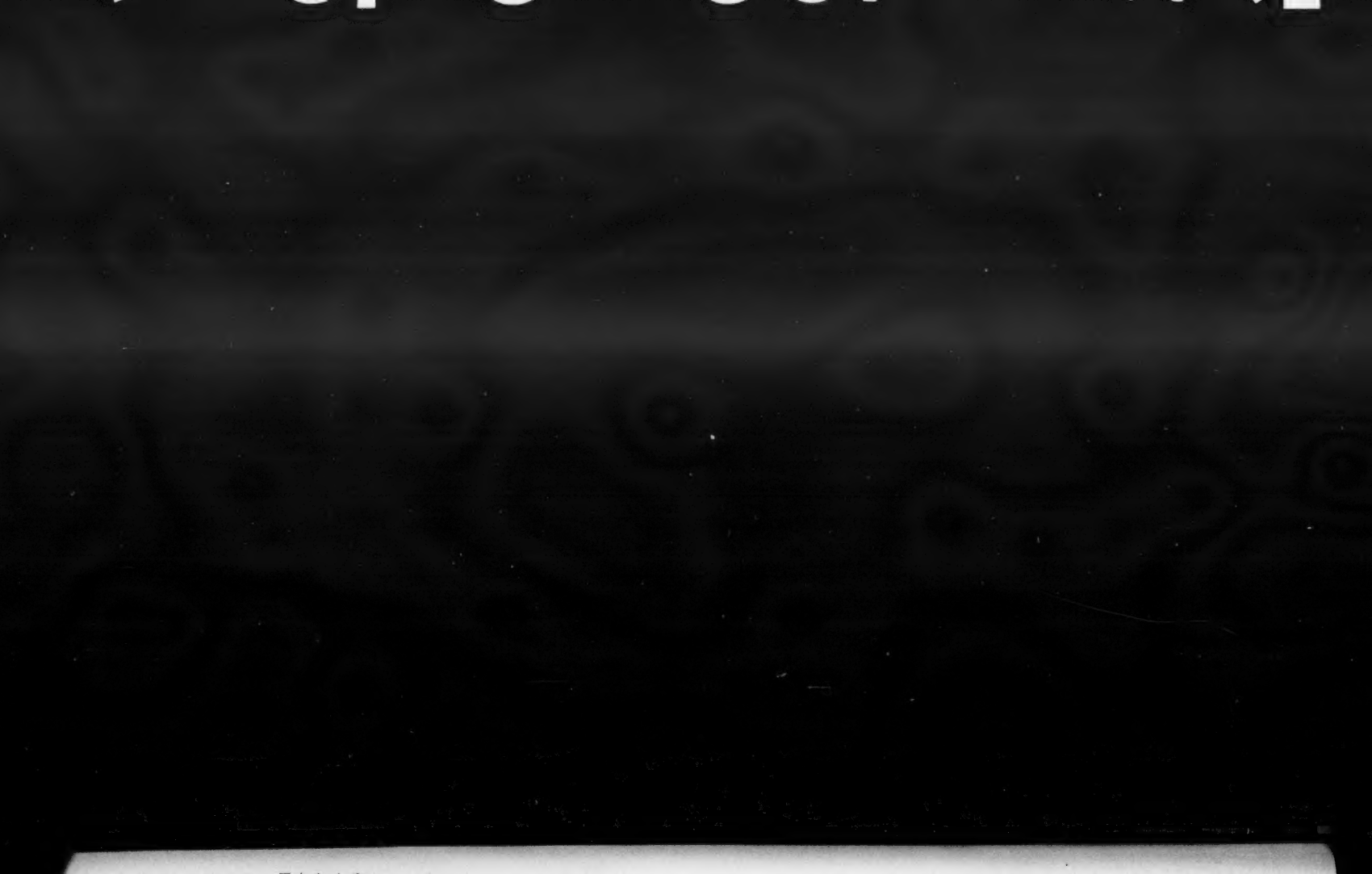
An interesting program has been arranged and those interested in this field of surgery are cordially invited to be present.

TRUMAN W. BROPHY, *President,*
81 East Madison St., Chicago.
HENRY SAGE DUNNING.
Secretary and Treasurer,
33 East 68th Street, New York City.

THE CONNECTICUT DENTAL COMMISSION

The Connecticut Dental Commission will meet at Hartford, Connecticut on December 6, 7 and 8, 1923, to examine applicants for license to practice dentistry and dental hygiene and to transact any other business proper to come before them. For further information apply to

ARTHUR B. HOLMES, *Recorder,*
63 Bank St., Waterbury, Connecticut.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA

The annual fall three-day meeting of the Odontological Society of Western Pennsylvania will be held at the William Penn Hotel, Pittsburgh, Pennsylvania, November 20, 21 and 22, 1923. The meeting will consist of exhibits, papers, progressive and table clinics.